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Development of a Battle Staff Guide for Selected Digital Information Systems

William R. Sanders and Gary S. Elliott
U.S. Army Research Institute

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14. ABSTRACT *(Maximum 200 words)*:

A prototype job aid titled Battle Staff Guide for Selected Digital Information Systems was produced and evaluated to support the training and job performance requirements of a combined arms battalion task force equipped with digital communications systems. The job aid presents troop-leading procedures task information in a flexible checklist format. While participating in the Army's Advanced Warfighting Experiment, Focused Dispatch (AWE FD), the battle staff of the U.S. Army Armor School's 16th Cavalry Regiment, 2nd Battalion, 33rd Armor Task Force (TF 2-33 AR), reviewed the prototype job aid and gave positive support to the development of such materials. Battle staff feedback identified new approaches to command and control that take advantage of the advanced capabilities offered by the new digital systems to allow for rapid and dispersed operations.

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FOREWORD

The goal of the present research was to develop and evaluate a job aid to assist a digitized battalion task force battle staff in performing troop-leading procedures using newly introduced digital information systems capabilities. As the Army prepares to fight on the digital battlefield, modern communications systems are being introduced that have the potential to greatly increase the capability to perform rapid and dispersed operations. Along with the increased capabilities, the new systems can also place great demands on the soldier's ability to accurately remember and perform long sequences of digital tasks. Job aids can relieve some of these mental demands by breaking large tasks into a series of smaller steps in a checklist format. The frequent introduction of software updates can also quickly make written materials obsolete. For this reason, the job aid is produced in a flexible format so that units can update materials locally as changes to equipment, software, and tactics, techniques, and procedures are introduced.

The Battle Staff Guide for Selected Digital Information Systems was developed to help the battalion task force battle staff take maximum advantage of the advanced capabilities afforded by the new generation of digitized command, control, and communication (C3) systems. The research was performed by the Future Battlefield Conditions Team of the Fort Knox Armored Forces Research Unit (AFRU) of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) under Work Package 2228, Force XXI Training Methods and Strategies (FASTTRAIN). ARI's research is supported by a Memorandum of Agreement between the U.S. Army Armor Center (USAARMC) and Fort Knox and ARI entitled "Manpower, Personnel and Training Research, Development, Test, and Evaluation for the Mounted Forces," dated 16 October 1995.

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DEVELOPMENT OF A BATTLE STAFF GUIDE FOR SELECTED DIGITAL INFORMATION SYSTEMS

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DEVELOPMENT OF A BATTLE STAFF GUIDE FOR SELECTED DIGITAL INFORMATION SYSTEMS

Introduction

Requirement

As the Army prepares to fight on the digital battlefield its soldiers will be faced with a rapidly expanding set of complex tasks associated with the introduction of new digital information systems. The Advanced Warfighting Experiment, Focused Dispatch (AWE FD), was conducted in 1995 as a series of experiments employing constructive and virtual simulations and live experiments to gain small unit effectiveness insights, develop digitized training support packages, and validate digital doctrine/tactics techniques and procedures (TTP) for digitized forces (U.S. Army Armor Center, 1995a). Several new digital systems were introduced into the U.S. Army Armor School's 16th Cavalry, Task Force 2d Battalion, 33d Armor (TF 2-33 AR) for this experiment. Given this situation, it was hypothesized that the battalion task force battle staff might benefit from job aiding of new tasks that arise from the integration of new digital systems capabilities into the performance of troop leading procedures.

Goal of the Present Research

The goal of the present research was to develop and evaluate a job aid to assist the digitized battalion battle staff in performing troop leading procedures and some basic digital information systems tasks. The battalion battle staff consisted of the Executive Officer (XO), and the coordinating staff officers to include the S1 Personnel Officer, the S2 Intelligence Officer, the S3 Operations Officer, the S3 Air Operations Officer, and the S4 Logistics officer. The Battalion Maintenance Officer and assistants to the coordinating staff were also members of the battle staff. The Battle Staff Guide for Selected Digital Information Systems was developed as a prototype job aid that could help to prepare the battle staff to take maximum advantage of the advanced capabilities afforded by evolving digitized command, control, and communications (C3) systems. The complete text of the job aid is provided as Appendix D. The job aid is a written document produced in the 5 3/4 x 7 inch format used in standard flight crew checklist books. Text was presented in large font, with much of the material written in a checklist format. The flight crew checklist book has clear plastic page sleeves which allows easy replacement or updating of pages. It is anticipated that other potential users of the job aid, such as the 4TH Infantry Division (Mechanized), Experimental Force (EXFOR) at Fort Hood, might be able to adapt the materials to meet the requirements for integrating their own unique set of digital systems.

Background

ARI role in training development. The ARI Armored Forces Research Unit (AFRU) supported the Mounted Battlespace Battle Lab (MBBL) effort for AWE FD. The AFRU charter emphasizes efforts to design, develop, and evaluate training systems and training methods. This includes the mission to determine training requirements for future systems as a part of the digitization of the battlefield. Initial observations and participation in AWE FD train-up activities by ARI staff indicated that training materials were either absent or not easily accessed for some new digital tasks. It was determined that the battle staff could benefit from a "memory jogger" which lays out the functions and many detailed tasks associated with battalion task force troop leading procedures, and a quick reference guide to Intervehicular Information System (IVIS) procedural tasks.

The role of job aids. There is a strong base of support for the introduction of job aids in situations where people are faced with large sets of complex tasks. Swezey (1987) argues that "As systems become more complex, it becomes increasingly apparent that exclusive reliance upon individual skills and memory in order to assemble, operate, and maintain complex systems is futile" (p. 1040). Job aiding has been advocated in response to this need. Swezey (1987) uses the term job aids to mean "devices which are designed to increase the human capacity for information storage and retrieval. They reduce not only the amount of decision making necessary to perform a task, but also the need for human retention of procedures and references" (p. 1040).

Army equipment job aid examples. Job aids have been produced by ARI AFRU in the past to support the performance of complex tasks associated with sophisticated new armor systems. With the introduction of the M1 Abrams tank, crewmen were required to perform a number of long procedural tasks to prepare electronic systems prior to combat operations, and to power these systems down after operations. It was noted that during early testing of the M1 many preoperational tasks were not being performed correctly, and that the Training Manual (TM) was not being used. Vaughan, Silbernagel, and Goldberg (1982) argue that "Features of the TM, such as its large size, its being designed for novice performers, and its detailed task descriptions could have contributed causing these problems" (p. v). The M1 Procedure Guides (Vaughan et al., 1982) were developed to supplement the TM. The pocket-sized guides provide flow chart format information in sufficient detail for trained crewmen to perform M1 tasks.

Army leadership job aid examples. The ARI Infantry Forces Research Unit (IFRU) has produced several Combat Leaders' Guides which illustrate how job aiding can be applied to Army leadership tasks. The Combat Leaders' Guide: Platoon leaders, platoon sergeants, and squad leaders (Winn, Evensen, & Salter (1987a) and the Combat Leaders' Guide: Rifle platoon and squad (Winn,

Evensen, & Salter (1987b) present step-wise summaries of tasks drawn from Soldiers' Manuals and other training documents, and are designed to overcome the potential effects of performance decay over time and during periods of high stress and fatigue. This material has been revised and updated as the Combat Leaders' Guide: 1994 Leader Handbook (CLG) (Salter, 1994), a pocket-sized job performance aid that presents tasks in large type and checklist format. The process of CLG task selection and development is described in two reports, Evaluation of a Job Aid System for Combat Leaders: Rifle Platoon and Squad (Evensen, Winn, and Salter, 1988) and Authoring Guide: A Job Aid to Design and Produce a Combat Leaders' Guide (Winn & Evensen, 1988). Small handbooks are available to support the general training needs of the battle staff, though these do not specifically address the integration of new digital systems. The Commander's Battle Staff Handbook (Pleban, Thompson, and Valentine, 1994) provides an overview of essential battle staff position functions and responsibilities, and provides references to fundamental doctrinal materials. This handbook provides a description of the core duties of battalion staff officers and key slice liaison officers on the battle staff, but does not present detailed task lists.

Job aiding the army planning process. Job aiding has been specifically advocated to support the military planning process, particularly in situations where soldiers must perform tasks while under stress or when fatigued. In developing the CLG, Evensen et al. (1988) argue that "A unit's success in battle depends upon how well the unit reacts to certain situations and how organized the unit's planning process is." The authors state that this job aid "was developed to facilitate the planning process, especially when the unit leader may be inexperienced, fatigued, or under stress because of continuous operations" (p. 31). The authors also note the value of job aids for assisting inexperienced staff. At the outset of AWE FD, TF 2-33 AR battle staff was inexperienced with regard to the newly introduced digital systems, which further supports the argument for job aiding the battle staff tasks.

Job aiding the digitized battle staff tasks. The task performance demands facing the digitized battalion task force battle staff involve the use of digital information systems to carry out troop leading procedures. It should be noted that during AWE FD digital system TTPs were evolving, and software updates were introduced, which resulted in frequent changes to these procedures. The prototype job aid was designed to present step-wise summaries of tasks drawn from Training Manuals, Special Texts, and other documents, and to directly link battle staff procedures to specific digital system tasks where possible. The job aid was designed to serve as a "memory jogger" helping the staff to remember how to integrate the new digital systems into the troop leading process, while also serving as a place where the staff could record task changes as they were introduced. The prototype job aid includes an example of how digital systems

procedural tasks could be presented in the step-wise job aid format. The IVIS Set-Up and Log-On tasks were presented in this format as an example of how procedural tasks for digital systems could be job aided.

Key digital information systems. Two key digital information systems that were introduced into the TF 2-33 AR battle staff operations for AWE FD were the IVIS, and the Brigade and Below Command and Control (B2C2) system. The IVIS and B2C2 systems were used by the battle staff, and battalion and supporting elements to present position location information, and to send formatted reports, overlay graphics, and free text messages. Both IVIS and B2C2 use the Single Channel Ground Air Radio System (SINCGARS) as the radio link for transmitting and receiving data. The SINCGARS also provides for FM voice communications. Training programs were developed at Fort Knox to provide initial and sustainment training on these systems. These training programs also provided an opportunity to explore the TTPs for incorporating the digital systems into troop leading procedures. Two other digital systems were used during AWE FD. The All Source Analysis System (ASAS) was introduced to handle intelligence data, and the Integrated Fire Support Assessment System (IFSAS) was introduced to support field artillery coordination. While the ASAS and IFSAS systems also play a crucial role in battalion task force operations, less information was available because the systems were used by fewer of the battle staff members, and a training program for these two systems was not established at Fort Knox. Less information was captured for incorporating ASAS and IFSAS tasks into the job aid than was the case for IVIS and B2C2.

IVIS description. The IVIS was developed as a company level asset, and was intended to improve command and control (C2) capabilities by constantly exchanging and updating position location/navigation data with other friendly users. This allowed users to display friendly positions on the IVIS screen. The IVIS provided the operator with the capability for sending and receiving preformatted reports, using a simple fill-in-the-blank format. The IVIS also provided for the creation of separate graphics overlays (Operations 1, Operations 2, Enemy, Obstacle, and Fire Support). The IVIS free text capability is limited to seven characters, which will be displayed on one of the graphic overlays. An operator can create a longer message by exiting and reentering the IVIS free text mode, but this is a time consuming process. The IVIS does not have an installed terrain database, and was, therefore, used to create simple map sketches. The IVIS was configured as a menu-driven computer workstation with monitor and keyboard in command and control vehicles (C2Vs), and as an integrated flat panel display system within the commander's integrated display (CID) in the M1A2 Abrams tanks. During AWE FD IVIS supported battalion level communications, with IVIS installed in the C2V tactical operations center (TOC), combat trains command post (CTCP), Battalion Task Force Commander's battle command vehicle (BCV), and the S-3 Operations Officer's

BCV. An IVIS capability was also provided, or simulated, for the Engineer (ENG), First Sergeant (1SG), and Fire Integration Support Team (FIST) vehicles, and the Scout Platoon Leader's (SCT PL) vehicle.

B2C2 system description. The B2C2 is a prototype application software designed to provide commanders and their staffs with tactical data for conducting C2 functions at the brigade and below level. The B2C2 was housed in a lightweight computer unit (LCU), which incorporates a display, keyboard, and trackball in a hard shell computer case for rugged field use. The B2C2 LCU has a color video display capable of presenting contour maps from an installed terrain database. The B2C2 system has an extensive free text capability which allows an operator to input 20,000 characters of free text on an overlay. This makes B2C2 much more effective than IVIS as a tool for composing and sending large messages such as the standard five paragraph operations order. The IVIS and B2C2 were able to exchange five key preformatted reports during AWE FD (Contact, Spot, Call for Fire, Situation, and Medical Evacuation). The IVIS and B2C2 could not exchange graphic overlays. The B2C2 was used to advise the Battalion Task Force Commander of the current ground situation and monitor the brigade and battalion close battle. The B2C2 systems were used by brigade, the Battalion Task Force Commander's BCV, the S-3 Operations Officer's BCV, the C2V TOC, the CTCP, Company 1SG vehicle, the Battalion Maintenance Officer (BMO), field trains command post (FTCP), and battalion aid station (BN AID STA). The B2C2 was also provided at the Scout Platoon Sergeant (SCT PSG) vehicle, and heavy mortar (HV MORT) support section.

Figure 1 presents a sample digital systems architecture for the battalion task force that shows the major digital information links between the battalion task force elements, and the digital systems used (adapted from U.S. Army Armor Center, 1995b).

Method

General Approach

The authors took a six step approach to developing the battle staff job aid. The approach began with a review of the job aid literature to identify a set of criteria that could be used for selecting tasks that should be included in a job aid. Next, the available doctrinal literature and reports were reviewed to identify battle staff tasks that are good candidates for job aiding. The focus of the search was on tasks related to the integration of digital communications systems. The authors observed battle staff train-up activities during AWE FD to identify tasks that appear to be likely candidates for job aiding. The staff train-up activities focused heavily on troop leading procedures, and explored ways to incorporate digital systems into the process. A draft job aid booklet was constructed next in order to obtain early soldier feedback on the

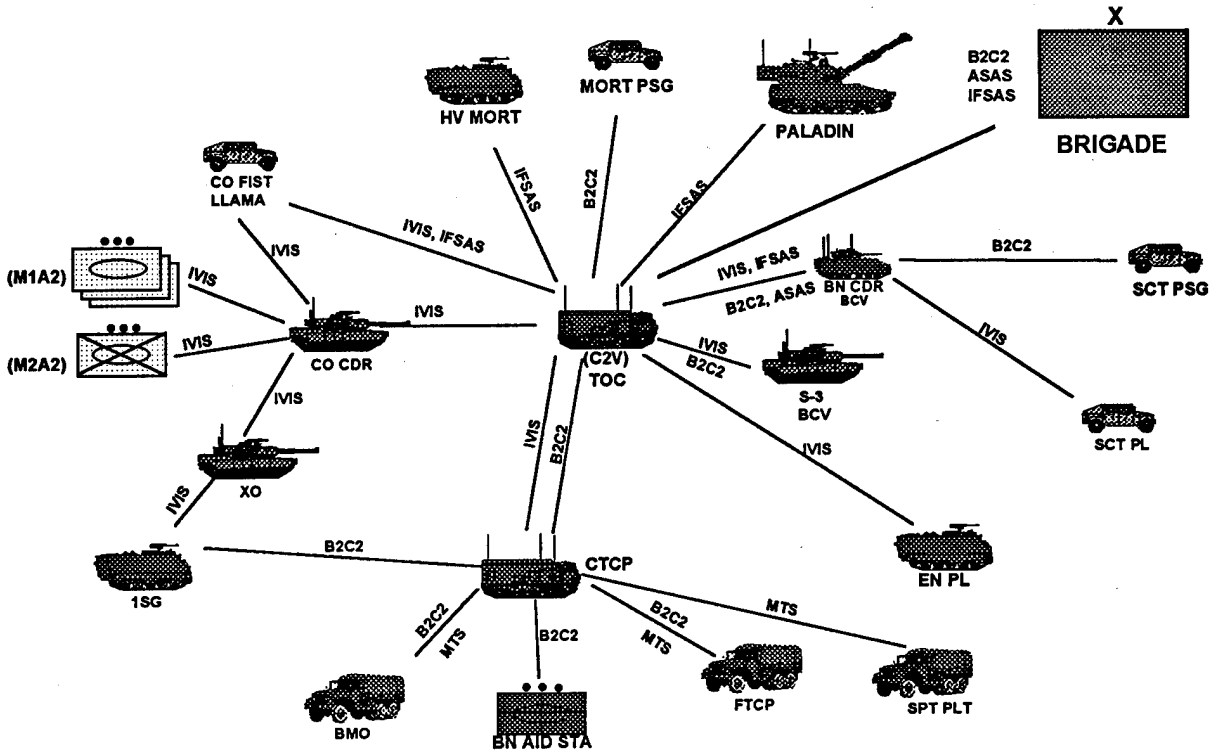

Figure 1. Sample digital systems architecture for a battalion task force (adapted from U.S. Army Armor Center, 1995b).

appropriateness of the job aid content and format before drafting the full job aid. The revised draft job aid was then provided to the TF 2-33 AR battle staff. TF 2-33 AR personnel reviewed the job aid materials and provided feedback after they have gained experience with digital communications systems. Finally, the draft job aid was revised to incorporate battle staff feedback.

Step 1: Review of Job Aid Literature and Reports

The authors reviewed the job aid literature to identify a set of criteria that could be used in selecting a set of tasks for inclusion in the job aid. The seven criteria presented in a previous job aid development effort (Evensen et al., 1988) in making their initial selection of tasks for the job aid were considered. These criteria are summarized for the present research as follows:

Task delay tolerance/rate of performance. Must the task be done without hesitation or very fast? Low task delay tolerance (tasks must be completed within 1 minute) argues against job aiding for performance of the task (the job aid could still be of value in training the task).

Physical constraints. Would a job aid be difficult or impossible to use while doing the task? Don't bother job aiding a task if the soldier cannot use any type of job aid while performing the task.

Frequency of performance. Will the task be done often enough to account for the cost of overlearning? Tasks that are performed only once a month or less are definite candidates for job aiding, while more frequently performed tasks might also be job aided.

Consequences of error. Will doing the task incorrectly result in mission failure, death, serious injury or equipment damage? Consider job aiding a task if bad consequences are associated with performance errors.

Number of steps. Does the task have many steps? Consider job aiding tasks with four or more steps.

Difficulty. Does the task have a number of difficult sequences, decisions, and/or discriminations? Tasks with long sequences of subtasks and/or multiple decisions should be considered as candidates for job aiding.

Chance of change. Is there a chance that the way the task is performed will change? If task method will change within 24 months consider job aiding.

Step 2: Review of Doctrinal Literature and Reports

In an effort to better understand the demands placed on a battalion task force when new digital communications equipment is introduced, the authors reviewed Special Text (ST) 71-2-2 Tactics, Techniques and Procedures for the Digitized Battalion Task Force (U.S. Department of the Army, 1995a); ST 71-3 Tactics, Techniques and Procedures for the Digitized Brigade (U.S. Department of the Army, 1995b); and Task Force 2-33 Armor Tiger Tactical Standing Operating Procedures (TACSOP) (U.S. Army Armor Center, 1995c). From this initial review it appeared that the battle staff troop leading procedures would include a number of new digital tasks that might lend themselves to job aiding. Additional doctrinal materials were reviewed with an emphasis on the identification of troop leading procedure tasks, and procedural tasks associated with digital communications systems. Useful task force collective tasks lists appear in the Task Analysis for Plan for Combat Operations (Critical Combat Function 18) As Accomplished by a Battalion Task Force, Version 2 (McIlroy & Jarrett, 1995). Training manual TM 9-2350-288-10-1, Operator's Manual, Operator Controls, PMCS, and Operation Under Usual Conditions, Tank, Combat, Full-Tracked: 120-MM Gun, M1A2 (U.S. Department of the Army, 1995c) was reviewed to extract IVIS procedural tasks information. The Commander's Battle Staff Handbook (Pleban et al., 1994), and Combat Leader's Guide

(Salter, 1994) were reviewed for leadership task training requirements, and job aid format considerations.

From this review it was decided that the numerous tasks which make up battle staff troop leading procedures would be organized into a prototype battalion task force battle staff job aid. The basic eight steps of troop leading procedures as presented in Field Manual FM 71-123 Tactics and Techniques for Combined Arms Heavy Forces: Armored Brigade, Battalion/Task Force, and Company Team (U.S. Department of the Army, 1992) are as follows:

1. Receive the mission
2. Issue warning order
3. Make a tentative plan
4. Initiate movement
5. Conduct reconnaissance
6. Complete the plan
7. Issue the order
8. Supervise

Step 3: Observe Battalion Task Force Training and Exercises

The ARI researchers observed the training of TF 2-33 AR throughout AWE FD. Digital systems training began with a New Equipment Training (NET) for the M1A2 Abrams tank during which soldiers were introduced to the IVIS digital communications system, and concluded with the field evaluation held in the Western Kentucky Training Area (WKTA). Training events included a Simulation Networking (SIMNET) virtual simulation exercise, JANUS constructive simulation exercises, individual and collective training using computer workstations in the task force digital learning center, local training area exercises, and the final combined live/virtual field exercise held at WKTA. A detailed discussion of the training events supporting AWE FD is presented in Elliott and Sanders (in preparation).

Early observations of Task Force train-up activities confirmed that a great deal of emphasis was placed on training the numerous communication and coordination tasks that fall under the eight-step troop leading procedures process. The task force first practiced troop leading procedures in a conventional FM radio environment, then integrated the new digital equipment into the tasks. The TTPs for the use of digital systems in the performance of the troop leading procedures evolved over the course of the train-up activities, and were still being refined in the final field evaluation.

Step 4: Develop a Preliminary Set of Materials

Battle staff digital systems tasks evolved during the course of AWE FD as the staff gained experience and tried alternative approaches to utilizing the systems. Due to the evolving nature of the digital tasks, a firm set of tasks was not available at

the outset for inclusion in the job aid. Likewise, experienced subject matter experts (SMEs) were not available to rate tasks as part of the process for selecting tasks to job aid. The authors selected the preliminary set of tasks for inclusion in the draft job aid with the intent that this material might assist the battle staff in the conduct of AWE FD, and would also serve as a useful tool for gathering feedback.

The eight-step battle staff troop leading procedures were chosen as the task area to address in the job aid. The doctrinal literature and training materials were reviewed to extract material that would support the troop leading procedures and related digital system procedural task requirements. In some cases existing checklists were available that could be included in the job aid, while elsewhere paragraphs of text were found that could be reduced into a checklist format for ease of use. Additional materials were generated from soldier recommendations.

Step 5: Battle Staff Evaluation of the Job Aid

Job aid evaluation plan. The objectives of the job aid evaluation were to provide the battle staff with the draft guide in a realistic work environment, and have them estimate the usefulness of the job aid in both training and combat situations. They were asked to identify any tasks that should be added to, or deleted from the job aid, or changes necessary to correct errors in the way tasks were represented in the job aid.

Field evaluation comments. Draft job aids were provided prior to the final AWE FD field exercise for each vehicle in the task force where battle staffs performed digital tasks, to include Company Commanders. Each job aid contained an "Instructions" card which asked reviewers to pencil in comments for improvements and changes, and to use the blank "Notes" cards provided in the job aid to record additional recommendations. Reviewers were asked to read through the materials and identify tasks that should be added, removed, or rewritten for clarity.

Job aid feedback form. Respondents completed a two-page feedback form (ARI PT 59-75) at the conclusion of AWE FD, rating the job aid in response to ten questions, and provided add, drop, and change recommendations for the job aid content (see Appendix B). The feedback form was organized into four sections. The first section assessed participants' perceptions about the potential usefulness of the job aid in combat and training situations. The second section asked questions which help to establish whether the tasks were appropriate for job aiding. The third section asked whether the format size and text font of the job aid were appropriate. The questions and rating scales in these first three sections are based on a subset of items used in previous job aid development efforts with over four hundred respondents (Evensen et al., 1988), (Winn & Evensen, 1988). It was intended that the use of the same or similar questions and rating scales would enhance the comparability of the previous

large sample study and the present small sample effort. . The fourth section presented open-ended questions to identify job aid tasks that should be added, deleted, or changed for accuracy.

Step 6: Revise the Job Aid Based on Soldier Feedback

Based on soldier comments written on the job aids, and responses to the Job Aid Feedback Form, changes would be made to better reflect the battle staff troop leading process when using digital systems. More references to specific digital systems and tasks would be incorporated as available.

Results

Development of the Draft Job Aid

Initial selection of tasks for job aiding. The authors considered seven criteria presented in a previous job aid development effort by Evensen et al. (1988) in making their initial selection of tasks for the job aid. The seven criteria were: (a) task delay tolerance/rate of performance, (b) physical constraints, (c) frequency of performance, (d) consequences of error, (e) number of steps, (f) difficulty, and (g) chance of change.

The present authors compared the tasks within the eight-step troop leading procedures against the seven criteria prior to developing the initial set of job aiding materials for soldier review. It was concluded that the troop leading procedures generally meet the seven criteria for job aiding, and developed checklist materials to reflect these tasks in the draft job aid. The support for this conclusion is summarized below for each of the seven criteria.

1. Task delay tolerance. Low task delay (tasks that must be completed within 1 minute) argues against job aiding. The tasks being reviewed for job aiding were those performed within the eight-step troop leading procedures. The authors observed TF 2-33 AR training activities and noted the time allocated to different planning and preparation phases. TF 2-33 AR prepared an initial plan/prep time analysis for it's mission planning and preparation activities, and allocated at least fifteen minutes to each activity corresponding to troop leading procedure steps. Based on the TF 2-33 AR timeline and the authors' observations of battle staff task performance it was concluded that at least one minute was available for the performance of each of the eight steps in the troop leading procedures, which meets this criteria for job aiding.

2. Physical constraints. The criteria asks whether a job aid would be difficult or impossible to use while performing the task being aided. During AWE FD battle staff tasks were typically performed at work stations within command and control vehicles, or in spaces created to simulate the vehicle

environment. The question of job aid size and access during task performance was presented to TF 2-33 AR battle staff members early in the job aid development. Battle staff members indicated that they generally made up their own "cheat-sheet" notebooks for reference during task performance. The notebooks were generally in a 5 X 7 inch format. The authors concluded that it was very likely that a job aid in this 5 X 7 inch format would be accessible for the battle staff during task performance. The question of whether a job aid would be usable during task performance was specifically presented in the battle staff formal rating of the job aid.

3. Frequency of performance. Tasks that are performed frequently (several times each month) can become overlearned and would not be appropriate for job aiding. In discussions with the battle staff during train-up, the authors asked how often the TF was able to conduct an orders process exercise, and how often battalions in general would conduct a battle staff orders process exercise. The TF 2-33 AR battle staff indicated that a troop leading procedures exercise would be conducted about once a month in a battalion. The authors concluded that it was likely that troop leading procedure exercises were not performed so frequently (several times a month). Therefore, the tasks would not be overlearned and thus be appropriate for inclusion in a battle staff job aid.

4. Consequences of error. This criteria asks whether performing the task incorrectly could result in mission failure, death, serious injury or equipment damage. The recommendation is to job aid tasks if bad consequences are associated with errors. A review of the eight troop leading procedure steps suggests that a failure to perform any one of these steps could have serious negative consequences. A Center for Army Lessons Learned (CALL) newsletter (U.S. Army Combined Arms Command, 1993) presents an overview of the eight-step battle staff troop leading process and staff responsibilities. As a preface, the newsletter describes a disastrous action during the Korean conflict in 1950 where one thousand soldiers of the 31st Regimental Combat Team, 7th Infantry Division were killed or captured during a break-out attempt. The newsletter states that "Many of these casualties occurred during the breakout attempt and were direct results of poor staff operations." The newsletter concludes that "Individual courage could not replace the failure of the commander and his staff to plan, coordinate and synchronize a complex maneuver in the face of a relentless foe" (p. iii). The present authors concluded that a failure to effectively perform battle staff troop leading procedures can result in mission failure and other serious consequences, and that troop leading procedures thus are good candidates for inclusion in a job aid.

5. Number of steps. This criteria suggests that we consider job aiding for tasks with four or more steps. Each of the eight battle staff troop leading procedures contains numerous tasks and decision making requirements as detailed in FM 71-123

(1992) Tactics and Techniques for Combined Arms Heavy Forces: Armored Brigade, Battalion/Task Force, and Company Team. The authors concluded that each of the eight steps within the troop leading procedures contains four or more tasks or subtasks and thus meets the criteria for job aiding.

6. Difficulty. This criteria argues that tasks with long sequences of subtasks and/or multiple decisions should be considered as candidates for job aiding. The descriptions of troop leading procedures outlined in FM 71-123 (1992) Tactics and Techniques for Combined Arms Heavy Forces: Armored Brigade, Battalion/Task Force, and Company Team identify many subtasks and decisions associated with each of the troop leading procedures. In discussions with the Task Force Commander he reported that the job aiding of troop leading procedures was a useful action based on the needs of battle staff members. He perceived troop leading procedures tasks as an initial priority during AWE FD train-up as many of the battle staff slots that would normally be filled by captains were instead staffed by lieutenants. Captains would normally have completed the Armor Officer's Advanced Course (AOAC) which stresses training of troop leading procedures, while lieutenants would not. It needs to be recognized that the utility of the job aid for the AWE FD Task Force may stem from operating with a relatively untrained and inexperienced staff, compared to the ideal situation.

7. Chance of change. This criteria argues that tasks which are likely to change within 24 months should be considered for job aiding. During the course of AWE FD numerous software changes were introduced which modified the digital information system tasks the battle staff performed. It is very likely that digital troop leading procedure tasks will continue to change within the 24 month time frame as the TTPs continue to evolve to take optimum advantage of the capabilities of the new digital system hardware and software being introduced.

Job Aiding IVIS Procedural Tasks

The IVIS Set-Up and Log-On procedural tasks also appear to meet the criteria for job aiding, and so were included in the draft job aid. Company B of Task Force 2-33 AR was equipped with the M1A2 Abrams tank with the IVIS. In discussions with the Company B Commander, he stated that he needed a quick recovery IVIS drill, so that when the IVIS "crashed" and dropped off the communications net, the crews could follow a simple set of procedures to get back on. The authors observed soldiers experiencing difficulties and considerable lost time during train-up in performing IVIS Set-Up and Log-On procedures. These procedures contain long sequences of subtasks which are not intuitively obvious. The fact that multiple versions of the IVIS software were present, and that future software drops were planned to occur during train-up also justified the creation of checklist materials for the IVIS Set-Up and Log-On procedural tasks.

Job Aid Format

Previous research (Winn & Evensen, 1988) gathered extensive user acceptance evaluation data to arrive at a 4 inch by 5 3/4 inch job aid format for checklists and worksheets for the Combat Leaders' Guide. For the present effort, a sample of troop leading procedures tasks were initially drafted using the 4 X 5 3/4 inch format, and presented to battle staff personnel for review as to size. The battle staff personnel typically maintained their own "cheat sheet" note books in a larger format. The general response was that the checklist and worksheet format was appropriate, but that the job aid should be produced in the large format. The page dimensions, font style, and font size adopted for the draft job aid are presented in Figure 2. The 4 3/4 X 7 1/2 inch page format was chosen in part because it allows the use of standard five ring flight crew check lists books with their clear plastic page holders. The draft job aid contained forty-seven clear plastic inserts holding 94 pages back-to-back. Three empty page holders were included so that additional materials could be easily added.

Battle Staff Evaluation of the Job Aid

Utility of the job aid. The first section of the job aid feedback form requests respondents to rate how useful the job aid would be, overall, and in several settings. The questions and rating scale used in the feedback form were taken from a previous job aid development effort (Evensen et al., 1988). Nine members of the task force battle staff responded to the questions by making ratings on a 5-point Likert type scale. The Company and Troop Commanders were included in the review and rating of the job aid because of their experience carrying out troop leading procedures with the IVIS.

Table 1 presents a listing of the respondents by duty positions who completed the job aid feedback form. Given the small number of respondents, results were not subjected to statistical analysis, and are presented instead as descriptive statistics in Table 2. As shown in Table 2, five of the nine respondents gave a rating of "Useful" to the global question "How useful is the JA?". Seven of the nine respondents gave ratings of "Very Useful" or "Useful" when asked if the job aid would be useful when performing an actual combat mission, and during training exercises. The job aid received its highest usability rating as a personal training aid, with five of the nine respondents rating it "Very Useful" for this purpose.

Appropriateness of tasks for job aiding. Table 3 presents the responses to questions which sought to confirm whether the troop leading procedures and IVIS procedural tasks were appropriate for job aiding. Five of the nine respondents indicated that they made their own version of "cheat sheets", while six of the nine respondents indicated that they used some form of notes or "cheat sheets" while performing their mission in

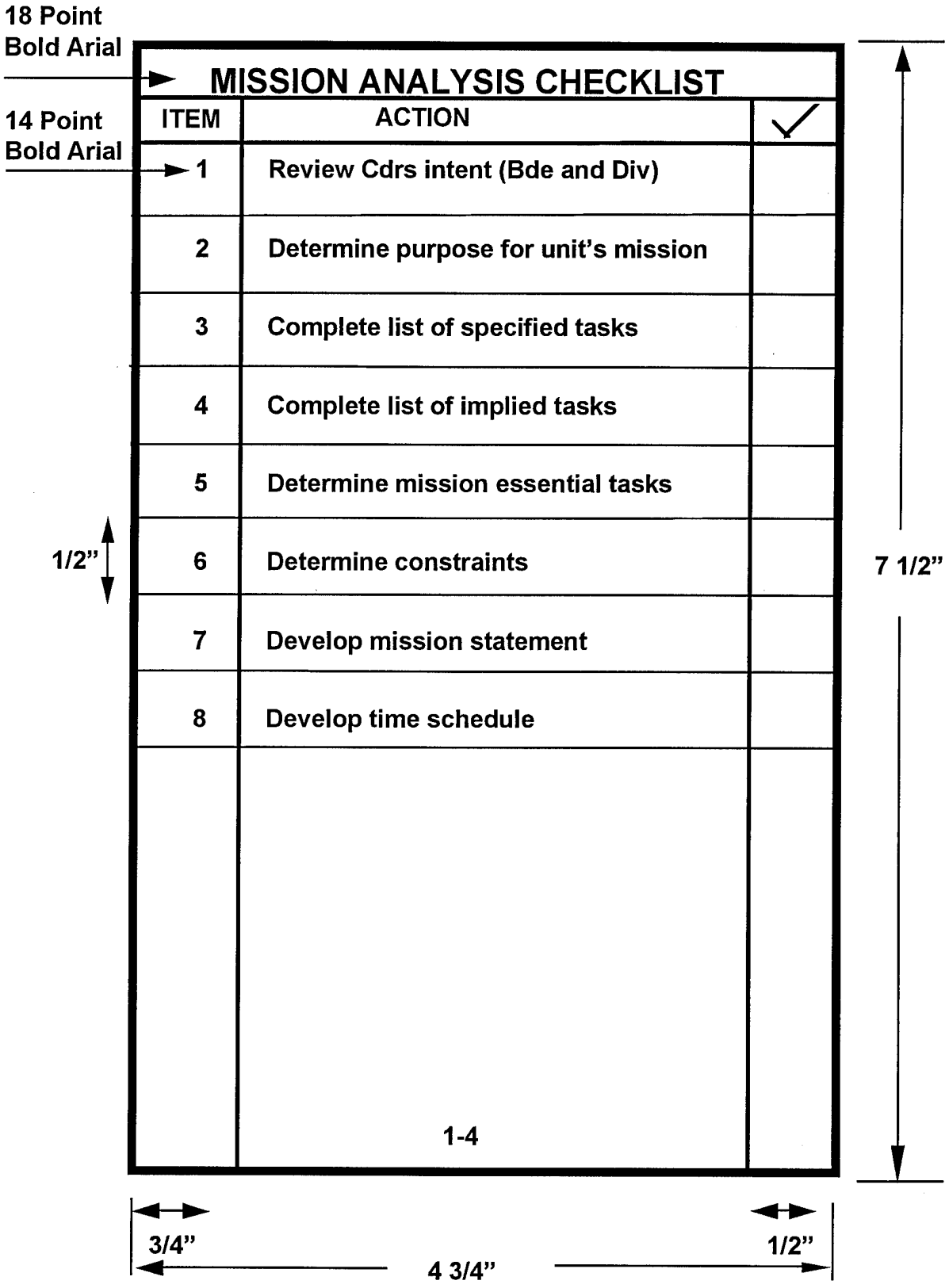

Figure 2. Job aid page format.

Table 1

Respondents' Duty Position in Task Force

Duty Position
S2 - Intelligence Officer
- Assistant S2
S3 - Operations Officer
- Assistant S3
- S3 Air
S4 - Logistics Officer
Alpha Company Commander
Bravo Company Commander
Delta Troop Commander

Table 2

Respondents' Job Aid Utility Ratings (N=9)

	Very Useful	Useful	So-So	Not Useful	Not Useful at All
How useful is the JA?		5	2	2	
Would the JA be useful when performing an actual combat mission?	1	6	1	1	
Would the JA be useful during training exercises?	1	6	2		
Would the JA be useful as a personal training aid?	5	2	2		

AWE FD. This lends support to the notion that the battle staff perceives a need for a quick reference guide beyond the available doctrinal materials. Questions from the previous work with the Combat Leader's Guide (Evensen et al., 1988), were presented to determine whether soldiers could use the job aid while performing tasks, and whether the tasks were likely to change. The respondents ratings unanimously indicated that they could use the job aid during job performance. It should be noted that one respondent made the written comment that the job aid would be "Difficult (to use) during execution phase" which might reflect different job performance requirements for the plan and prepare versus execution phases of an operation. Evensen et al. (1988) argue that tasks which are likely to change within the next 24 months are good candidates for job aiding. The fact that they change reduces the effectiveness of committing these tasks to memory. The battle staff in the present study unanimously indicated that they expected the digital tasks presented in the job aid to change.

Table 3

Respondents' Job Aid Task Appropriateness Ratings (N=9)

	YES	NO	COMMENTS
Did you make notes or "cheat sheets" like those in the JA for your own use?	5	4	
Did you use notes or "cheat sheets" while performing your missions in Focused Dispatch?	6	2	1 ("Not Applicable")
Would a JA be difficult or impossible to use while doing the tasks it describes?		9	Difficult during Execution phase
Is there a chance that the way the JA tasks are performed will change in the next 24 months?	9		B2C2 won't go to 1st Cavalry Division. Change to Enhanced Position Location and Reporting System (EPLRS) based Applique. Digital operations have already changed.

Job aid format. Table 4 presents the responses to questions regarding the job aid format. The respondents unanimously agreed that the job aid should remain in the 4 3/4 X 7 1/2 inch format. Eight of the nine respondents indicated that the type font in the job aid was appropriate.

Table 4

Respondents' Job Aid Format Ratings (N=9)

	Make it smaller	Make it bigger	Keep it this size
Size of Job Aid?			9
Type font in Job Aid?		1	8

Additional information. Four open-ended questions were asked regarding whether the draft job aid covered the right tasks, and whether tasks should be added, dropped, or changed for accuracy. The battle staff had generally approved the inclusion of troop leading procedures and IVIS procedural tasks in the initial draft of the job aid. However, their input had come early on in the train-up process when the staff was not proficient on the new systems. The job aid feedback form was administered after the completion of AWE FD, which allowed the staff to make recommendations based on their extensive hands-on experience with the digital communications systems. The full text of reviewer responses is presented in Appendix C along with the comments that were written onto the draft materials by reviewers. A general summary of responses to each question follows:

1. Does the JA cover the right tasks?
   Responses: In general, the JA does cover the right tasks for the battle staff.

2. What tasks should be added?
   Responses: Requests for more "How to do it" detail, equipment trouble shooting guidance for the new digital systems, more integration of standard charts for data entry.

3. What tasks should be deleted?
   Responses: Recommendation to cut back on the conventional orders process guidance -- focus more on digital.

4. What JA sections need major revision due to missing or incomplete information, errors, misunderstanding of the tasks?
   Responses: Include all report formats, more detailed M1A2 information, blanks for orders process, distribute the job aid during train-up, prepare for new revisions.

Change recommendations written on job aid materials. Comments recorded on the draft job aid materials recommended that the organization of the tasks within the troop leading procedures be changed to make it consistent with the way they were actually performing their tasks. The traditional eight-step troop leading process contains tasks that are generally performed in a sequential top-down fashion. Soldiers commented that while the eight-step procedures approach was an accurate depiction of current doctrine, it was not the way the digitized battalion task force operated.

Revised Job Aid Content

Based on battle staff input and follow-on interviews, the job aid content was revised to better represent the "digital" as opposed to "conventional" command and control processes. More detail was included where possible to describe the step-by-step digital procedures. Digital lessons learned developed by Deakins (1995) were incorporated into the revised job aid which reorganize the conventional eight-step sequential troop leading procedures approach into a four-step parallel planning process. The significance of the reorganization is that the digital communication systems allow tasks to occur concurrently, with battle staff and subordinates working with shared digital text and graphics from dispersed locations. The digital systems capabilities decrease overall planning and preparation time requirements, while increasing the relative time available to subordinate units for these activities. A graphic representation of the continuous planning process (U.S. Army Armor Center, 1994) was added to the front of the job aid. This illustration provides soldiers with an overview picture of the digital information flow which can help to put the detailed job aid information in perspective. A checklist for sending and reading IVIS reports derived from an Armor School product (U.S. Army Armor Center, 1995d) was added to the job aid, as well as a checklist for editing and sending overlays.

Discussion

Leaders Support the Job Aiding of Digital Tasks

The battle staff, Company Commanders, and Troop Leader of TF 2-33 AR generally approved the introduction of a job aid for digital tasks. Seven out of nine soldiers rated the job aid "Very Useful" or "Useful" for use as a personal training aid, during training exercises, and when performing an actual combat mission. Raters differed in their opinions about how much detail

on conventional procedures should be in the job aid. The difference of opinion may reflect differences in experience, with less experienced leaders desiring more detail. From the beginning of train-up through the conclusion of the exercise the leaders of TF 2-33 AR made notes to remind themselves of important task information. The Battalion Task Force Commander emphasized the need to create checklists for the new digital tasks the soldiers faced. The present research was an effort to systematically identify key tasks that could benefit from job aiding, and to capture good ideas from the battle staff, Company Commanders, and Troop Leader about how the digital tasks could best be performed.

Job Aids Can Ease the Transition to New Equipment

We can expect that change will be the norm for the immediate future of the Army. New hardware and software will appear frequently for the digital systems. Efforts to digitize armor systems are still relatively new, and the initial systems being fielded are not mature. The new digital systems can be intolerant of operator errors, and may not show the "graceful degradation" designed into commercial computer products, and required in the Systems Manpower and Personnel Integration (MANPRINT) Management Plan (SMMP)(U.S. Army Armor School, 1989). The battle staff for Focused Dispatch stated that failure to follow the exact steps when turning off one system easily resulted in a loss of data at the command and control vehicle. Depending on the time the mistake occurs, this failure could require the task force to fight the battle in a purely conventional mode. Particularly during this early phase of digital system maturity, job aids can assist soldiers in performing complex tasks and responding to software changes.

Checklisting Supports Task Delegation

There appears to be a tendency for leaders to assume responsibility for critical but routine tasks when they are first introduced. Breaking down tasks into checklists can help soldiers avoid making mistakes. They can also help leaders delegate work to optimize the resources of the entire battalion task force. During the AWE FD exercises the Battalion Task Force Commander stressed the need for his battle staff to generate checklists to avoid costly mistakes, and to synchronize battle staff task performance. Specifically, he called for a checklist procedure to synchronize the "Power-Up" and "Log-On" procedures for the full battalion, not just individual vehicles or specific radio nets. A major benefit of this checklisting effort was the realization that these tasks, now made routine, could be delegated to the combat trains command post staff. This task delegation allowed the command and control vehicle tactical operations center staff to perform other high priority activities in parallel with the battalion-wide "Power-Up" and "Log-On" procedures, rather than having to perform both tasks in sequence.

Embedding Job Aids

Army embedded training policy. The advantages gained in developing paper-based job aids for the battle staff must be weighed against the alternative of embedding this information directly into the soldier's digital systems. Army policy dictates that "An embedded training capability will be thoroughly evaluated and considered as the preferred alternative among other approaches to the incorporation of training sub-systems in the development and follow on Product Improvement Programs of all Army materiel systems." Here, embedded training is defined as "training that is provided by capabilities designed to be built into or added into operational systems to enhance and maintain the skill proficiency necessary to operate and maintain that equipment end item." (U.S. Department of the Army, 1987). Embedded training offers the benefits of having refresher and sustainment training resident in the equipment, and the potential for high training fidelity without the cost of separate training devices.

Embedding job aids in digital systems. Battle staff digital tasks might be well suited for an embedded training application. The digital communications systems used by the battle staff already have text and graphics capabilities, and might be programmed with simple "memory jogger" checklists similar to those in the present battle staff job aid. It can be argued that in some ways the preformated fill-in-the-blank and select-an-option screen design features already present in the systems are essentially "memory joggers" that prompt the operator as to the type of information to input. Embedded job aids could go beyond this message formatting function and provide the lists of tasks, simple reference charts, and samples of overlay graphics found in the paper job aid. By providing multiple layers of menus and submenus an embedded job aid could allow the soldier to review information in as little or as much detail as desired, without having to carry around bulky manuals and reference materials. A limited free text capability would allow soldiers to tailor information to their own needs, and update materials quickly as TTPs change. While the paper job aid might be replaced by embedding this information directly into the digital system, the key principles and approach to job aid development followed in the present research would remain the same. Developing simple and easy to read checklists of tasks that can be rapidly updated in response to change should remain essential for success.

Summary and Conclusions

Goals and Objectives of This Research

The goal of the present research was to develop and evaluate a job aid to assist the digitized battalion battle staff in performing troop leading procedures, and some basic digital systems tasks. It has been argued by Evensen et al. (1988) that "A unit's success in battle depends upon how well the unit reacts

to certain situations and how organized the unit's planning process is" (p. 31). The Battle Staff Guide for Selected Digital Information Systems was developed as a prototype job aid that can help to prepare the battle staff to take maximum advantage of the advanced capabilities afforded by evolving digitized C3 systems. The research resulted in the development of a prototype job performance aid that can serve as a "memory jogger" to help organize the troop leading process, and digital system tasks, into step-by-step procedures that are easy to read and follow.

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APPENDIX A

GLOSSARY

Glossary

1SG	First Sergeant
AFRU	Armored Forces Research Unit
ARI	Army Research Institute
ASAS	All Source Analysis System
AWE FD	Advanced Warfighter Experiment, Focused Dispatch
B2C2	Brigade and Below Command and Control
BCV	Battle Command Vehicle
BMO	Battalion Maintenance Officer
BN AID STA	Battalion Aid Station
C2	Command and Control
C2V	Command and Control Vehicle
C3	Command, Control, and Communications
CALL	Center for Army Lessons Learned
CLG	Combat Leader's Guide
CTCP	Combat Trains Command Post
ENG	Engineer
EXFOR	2D Armored Division Experimental Force
FASTTRAIN	Force XXI Training Methods and Strategies
FIST	Fire Support Team
FTCP	Field Trains Command Post
HV MORT	Heavy Mortar
IFSAS	Initial Fire Support Automated System
IVIS	Intervehicular Information System
JA	Job Aid
LCU	Lightweight Computer Unit
MANPRINT	Manpower and Personnel Integration
MBBL	Mounted Battlespace Battle Lab
NET	New Equipment Training
SCT PL	Scout Platoon Leader
SCT PSG	Scout Platoon Sergeant
SIMNET	Simulation Network
SINCGARS	Single Channel Ground to Air Radio System
SMMP	Systems MANPRINT Management Plan
ST	Special Text
TACSOP	Tactical Standing Operating Procedure
TM	Technical Manual
TOC	Tactical Operations Center
TTP	Tactics, Techniques, and Procedures

Glossary (continued)

USAARMC . . . United States Army Armor Center

WKTA . . . . Western Kentucky Training Area

XO . . . . . Executive Officer

APPENDIX B

JOB AID QUESTIONNAIRE

NAME _____ DUTY POSITION _____ (ARI PT 59-75)

COMMANDER'S BATTLE STAFF GUIDE FOR THE DIGITIZED BATTALION TASK FORCE

PART 1: JOB AID (JA) USABILITY RATINGS

Please make a check mark in the box to indicate your response.

	Very Useful	Useful	So-So	Not Useful	Not Useful at All
How useful is the JA?					
Would the JA be useful when performing an actual combat mission?					
Would the JA be useful during training exercises?					
Would the JA be useful as a personal training aid?					

	YES	NO	COMMENTS
Did you make notes or "cheat sheets" like those in the JA for your own use?			
Did you use notes or "cheat sheets" while performing your missions in Focused Dispatch?			
Would a JA be difficult or impossible to use while doing the tasks it describes?			
Is there a chance that the way the JA tasks are performed will change in the next 24 months?			

	Make it smaller	Make it bigger	Keep it this size
Size of Job Aid?			
Type font in Job Aid?			

PART 2: JOB AID (JA) CONTENT REVIEW

We hope to get specific detailed information for revising the JA from comments that reviewers have written directly onto their JA books. At this time we would like to get an overview or summary of the most important changes that you think should be made to the JA.

1. In general, does the Job Aid cover the right tasks to support the Digitized Battalion Task Force Battle Staff?

2. What tasks should be added?

3. What tasks should be deleted?

4. What JA sections need major revision due to missing or incomplete information, errors, misunderstanding of the tasks ?

APPENDIX C

OPEN-ENDED QUESTIONNAIRE RESPONSES

PART 2: JOB AID (JA) CONTENT REVIEW

We hope to get specific detailed information for revising the JOB AID from comments that reviewers have written directly onto their JOB AID books. At this time we would like to get an overview or summary of the most important changes that you think should be made to the JOB AID.

1. In general, does the Job Aid cover the right tasks to support the Digitized Battalion Task Force Battle Staff?
   - The Digitized TF needs one reference source. The Job Book works well but is the TF SOP or Job Book the primary reference?
   - Yes overall, the specifics of how we do Intel business was not addressed - most of the book was N/A. I felt it focused to the S3 side of the house.
   - Yes. I was never able to fully review this document. It appeared useful as a self-training/familiarization tool. Actual use during execution would be very limited. Experience dictates that individuals will customize their own "cheat sheets" based on unit reports and requirements.
   - Yes, however in the months to come there should be some changes coming down on how a digital unit will do the orders process and conduct operations.
   - No, needs to be specific for job individual is performing.

2. What tasks should be added?
   - Checklist for company commander for Deliberate Defense, Movement to Contact, Defense in Sector, Hasty Attack, Deliberate Attack.
   - Need to add battle field calculus tables.
   - Need to add Krasnovian (opposition force) order of battle
   - Need charts so that leader can track combat power, maintenance status, and digital status.
   - Overall tasks were covered but the calculations or how to were not there
   - Tasks on trouble shooting problems on IVIS and B2C2. Also more information on how to set up B2C2, (particularly) in setting up OPFACS and User IDs.
   - Items in my (personally developed) job aid were items I believe (this staff person) should have/use.

3. What tasks should be deleted?
   - Some of the conventional orders process tactics, techniques, and procedures (TTP) may be deleted or rewritten because of lessons learned during AWE.

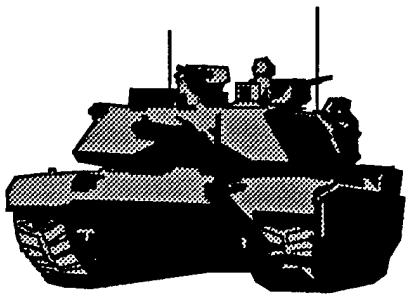
4. What JOB AID sections need major revision due to missing or incomplete information, errors, misunderstanding of the tasks ?
   - All the standard Red, Yellow, Black, Blue etc. (reports) should be added to the JOB AID. The TF TACSOP should be looked at to see what should be put into the JOB AID; also the M1A2 Tank Platoon/Company/Battalion TTP.
   - Need to include blanks for orders process so that staff S3 or whoever can fill in for staff estimate, WARNOs, etc.
   - Book needs to be distributed during train-up so that uses can be determined early. I received the JOB AID book at Greenville and had no real ability to evaluate and/or use it. Procedures were already established.
   - No revision is needed currently but as previously stated, some revisions will be necessary in the future after further Advanced Warfighting Experiments are done by Force XXI.

APPENDIX D

BATTLE STAFF GUIDE FOR SELECTED DIGITAL INFORMATION SYSTEMS

MARCH 1996

BATTLE STAFF GUIDE FOR SELECTED DIGITAL INFORMATION SYSTEMS



This job aid is intended for soldiers who work with Battalion Task Force digital communications equipment. The job aid contains information and checklists that describe how selected digital systems can be used to perform troop leading procedures. This job aid is not meant to be a substitute for the information contained in training materials. The job aid may serve as a training tool, as a "Memory Jogger", and as a place to record data.

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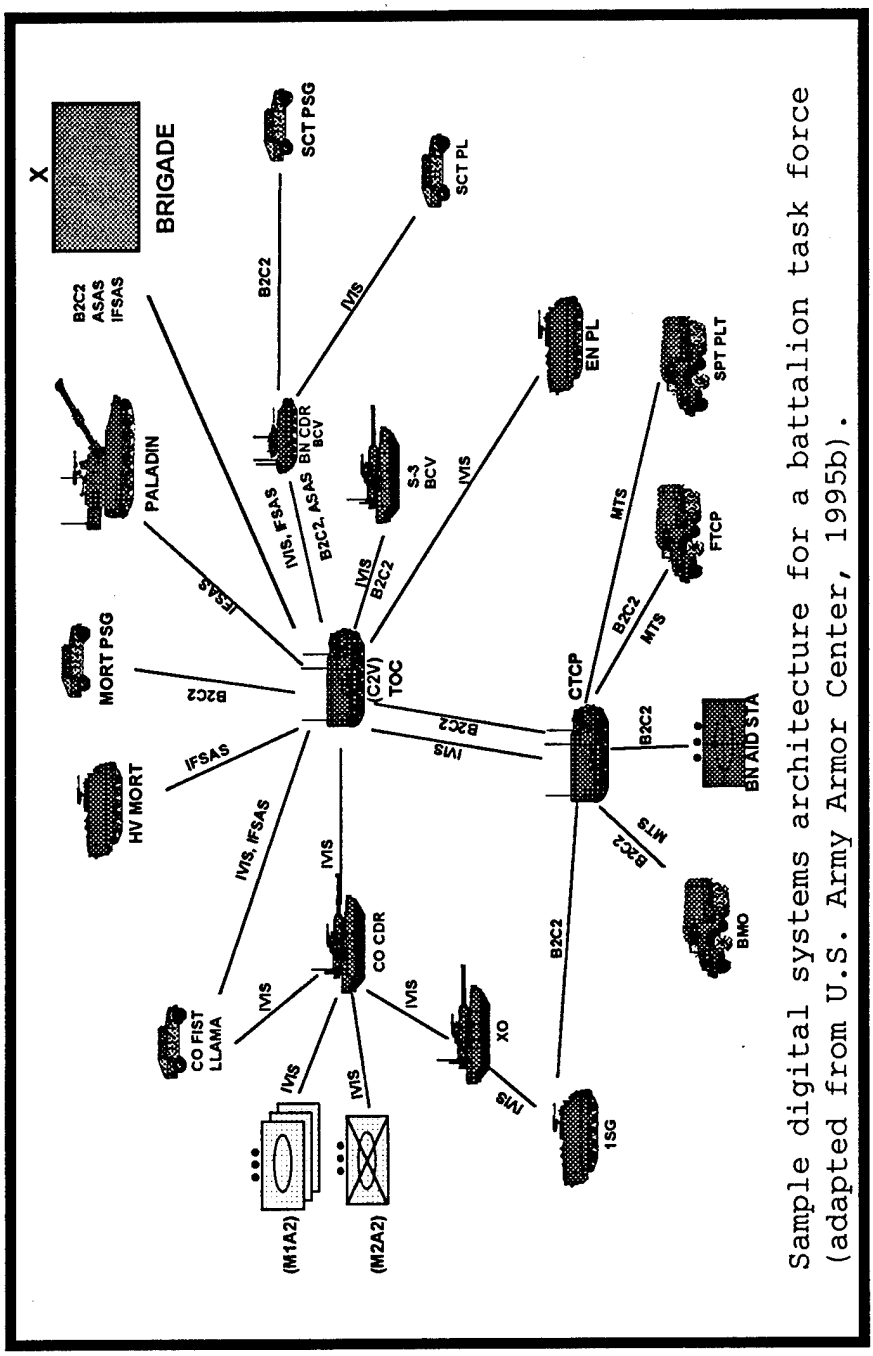
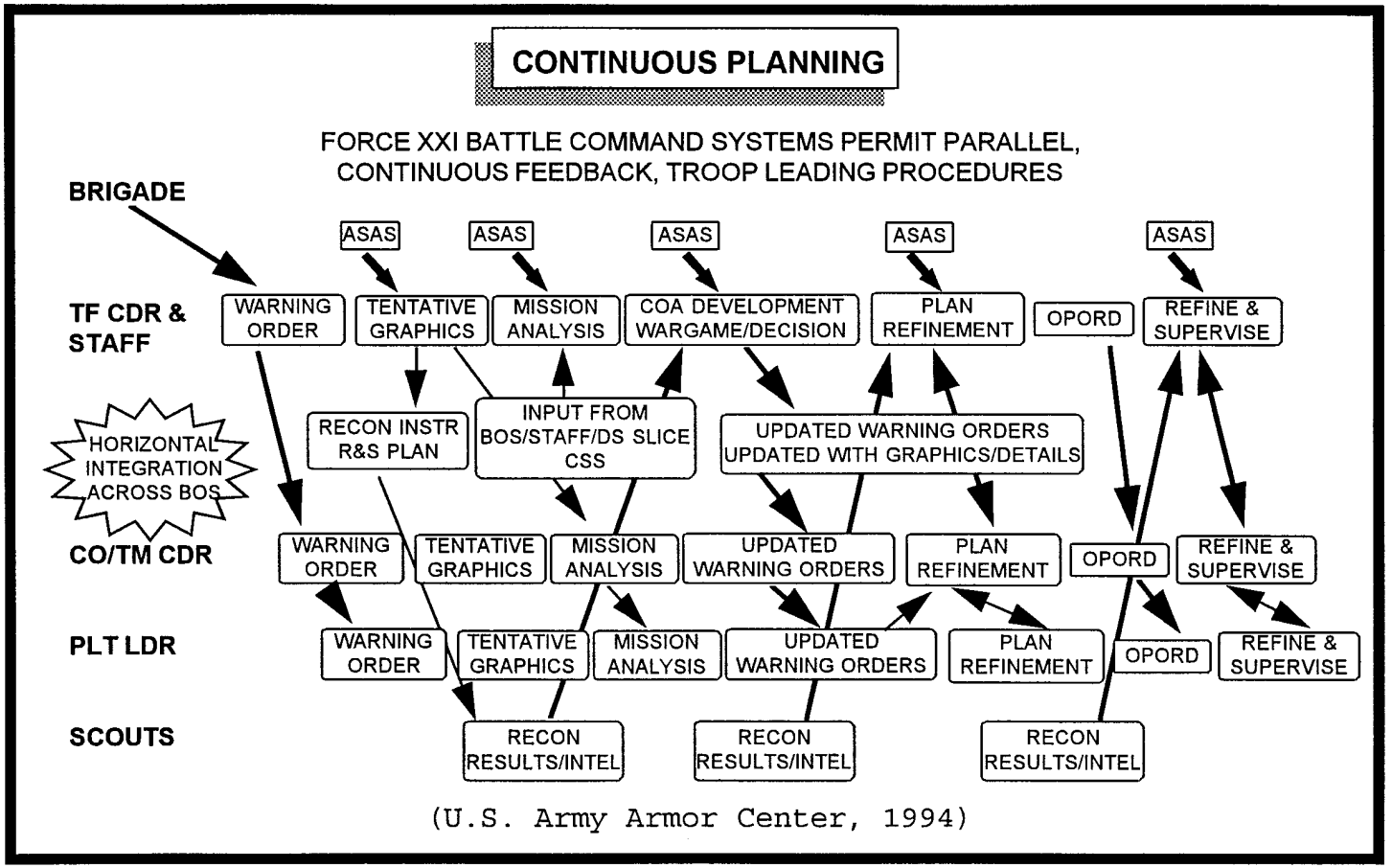
INTRODUCTION

This job aid is designed to help you take advantage of the capabilities of digital information systems. The job aid contains information and checklists that describe how selected digital systems can be used to perform troop leading procedures. Use this job aid as a reference during training, and as a memory jogger during task performance.

Add, remove, or update pages as needed based on your digital systems and mission.



Sample digital systems architecture for a battalion task force (adapted from U.S. Army Armor Center, 1995b).



(U.S. Army Armor Center, 1994)

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FOUR PHASES OF DIGITAL TROOP LEADING PROCEDURES

Force XXI digital battle command systems permit parallel, continuous feedback, troop leading procedures. This job aid presents the eight troop leading steps in a four phase approach, where steps within each phase can be performed in parallel. This approach can reduce overall battle staff planning and preparation time while allowing subordinates more time to prepare.

PHASE 1:
- Step 1. Receive the mission
- Step 2. Issue warning order

PHASE 2:
- Step 3. Make a tentative plan
- Step 4. Initiate movement
- Step 5. Conduct reconnaissance
- Step 6. Complete/update the plan

PHASE 3:
- Step 7. Issue the order

PHASE 4:
- Step 8. Supervise

1

STEPS	STAFF	COMMANDER
PHASE 1.		
1. Receive the mission	a. Initial warning order	
	b. Mission analysis	b.Mission analysis
	c. Initial time analysis	c.Initial time analysis
	d. Information to cdr	e Cdr's restated mission
		and planning guidance
2. Issue warning order	Issue digital warning order	
PHASE 2.		
3. Make tentative plan	a. Estimate of situation	a. Cdr's estimate
	(1) Mission	
	(2) Situation and COAs	
	(a) Situation (METT-T)	
	1. Terrain, weather,	
	and enemy	
	2. Own situation	
	3. Time (execution)	
	(b) Courses of action	
	(3) Analysis of COAs	
	(4) Comparison of COAs	
	(5) Recommendation	
	b. Decision briefing to cdr	
		c. Cdr's decision
		d. Cdr's concept of the
		operation
		e. Additional guidance
4. Initiate movement	a. Initiate movement	
5. Conduct	a. Control reconnaissance	a. Leader's recon
reconnaissance		
6. Complete the plan	a.Preparation of plan/order	
		b.Approval of plan/order
PHASE 3.		
7. Issue the order	a. Staff issues OPORD	
PHASE 4.		
8. Supervise	a. Conduct rehearsal	a. Conduct rehearsal
	b. Request & issue intell	b. Receive intelligence
	and weather update	and weather update
	c. Execute	c. Execute

STEP 1: RECEIVE THE MISSION

A. INITIAL WARNING ORDER

STEP	ACTIONS	✓
1	Bde Order sent to Bn via B2C2. Order provides text & graphics to support concept of operation. Bde Order gives:	
	a. Enemy situation	
	b. Most likely/dangerous COA	
	c. Higher unit's mission	
	d. Higher commander's intent	
2	Bn staff in C2V issues initial warning order (WARNO#1) verbally via FM to subordinate units quickly after receiving Bde order	
3	WARNO#1 briefly gives:	
	a. Enemy Situation: force, position, actions, possible friendly targets	
	b. Bn mission from Bde Order: action, location, time, Bn Cdr intent	

1-1

STEP 1: RECEIVE THE MISSION

A. INITIAL WARNING ORDER

STEP	ACTIONS	✓
3	(continued)	
	c. Subordinates begin to:	
	- Plan/manage available time	
	- Prepare necessary equipment	
	- Conduct digital communications and coordination rehearsals, battle drills	

STEP 1: RECEIVE THE MISSION

B. MISSION ANALYSIS

STEP	ACTIONS	✓
1	Staff analysis and planning occurs in parallel	
2	After issuing verbal WARNO#1 staff conducts mission analysis to identify the following:	
	a. Specified tasks	
	b. Implied tasks	
	c. Essential tasks	
	d. Limitations	
	e. Restated mission	
3	S2 & S3 Air use ASAS for terrain analysis, identify intervisibility lines, line of sight	
4	Staff uses B2C2 & IVIS to distribute graphics to subordinate units	
5	TF Cdr in BCV perform mission analysis in parallel with staff in C2V, does terrain analysis using his ASAS	

1-3

MISSION ANALYSIS CHECKLIST		
ITEM	ACTION	✓
1	Review Cdrs intent (Bde and Div)	
2	Determine purpose for unit's mission	
3	Complete list of specified tasks	
4	Complete list of implied tasks	
5	Determine mission essential tasks	
6	Determine constraints	
7	Develop mission statement	
8	Develop time schedule	
	1-4	

STEP 1: RECEIVE THE MISSION

C. INITIAL TIME ANALYSIS

STEP	ACTIONS	✓
1	Bn XO completes time line using backward planning:	
	a. Develops deliberate time line	
	b. Uses digital to speed exchange of plans over distance	
	c. Planning for staff, companies, slice happens in parallel	
	d. Key considerations for time management:	
	(1) Available light	
	(2) Plan & prep of combat orders	
	(3) Inspections and rehearsals	
	(4) Movement time requirements estimation	
	(5) Line of departure, start, critical, and release points time	
2	Cdr in BCV performs time analysis in parallel with staff, sends via B2C2 to S3 Air in C2V TOC	

1-5

STEP 1: RECEIVE THE MISSION

D. INFORMATION TO COMMANDER

STEP	ACTIONS	✓
1	C2V staff requests updates from 1SG's, S1, S4, and S3 via B2C2	
2	S1/S4 send roll-up SITREP of Bn personnel & equipment status to C2V staff via B2C2	
3	S2/S3 Air sends quick update of enemy situation to Cdr in BCV via ASAS/B2C2/IVIS	

E. CDR'S RESTATED MISSION

1	Cdr enters Restated Mission and Planning Guidance as free text into B2C2, sends to S3 Air in C2V	
2	Alternatively, Cdr may meet with C2V staff in person at this time, leave, return later to receive the staff's decision briefing	

1-7	PLANNING TIME/	36 HRS	24 HRS	8 HRS	3 HRS
	TASK:				
	Mission analysis				
	WARNO issued				
	Staff update				
	Cdr's guidance				
	S2 briefs initial IPB				
	COA's developed				
	COA briefed				
	Staff estimates complete				
	Wargame				
	Decision brief				
	Concept brief				
	OPORD issued				
	Synch matrix comp.				
	Plan briefed				

STEP 2: ISSUE WARNING ORDER #2

A. ISSUE DIGITAL WARNING ORDER

STEP	ACTIONS	✓
1	WARNO#1 sent out verbally from C2V gives:	
	a. Enemy Situation: force, position, actions, possible friendly targets	
	b. Bn mission: action, location, time, Cdr's intent	
2	Same time send digital WARNO#2 as free text and graphics	
	a. Staff sends to 1SG's, S1/S4, Bn Cdr, S3 via B2C2	
	b. Staff sends to scouts, subord. units via IVIS as Ops Overlay #1	
3	Companies can develop Fire Plans, send out engineers	
4	FSO develops initial Fire Support Plan	
	a. Develops on IFSAS from S2's R&S plan	
	b. Entered into IVIS as Fire Support Overlay, sent to subordinate units	

2-1

STEP 2: ISSUE WARNING ORDER #2

A. ISSUE DIGITAL WARNING ORDER

STEP	ACTIONS	✓
5	continued: Scouts can go out at this time	
	a. Staff sends short verbal R&S plan to scouts giving mission, locations to observe	
	b. S2 sends updated R&S plan with graphics to scouts via B2C2/IVIS that includes control measures:	
	- Limits of advance	
	- Routes and recon objectives	
	- Contact points	
6	S1/S4 receives logistics and personnel reports from company 1SG's via B2C2	

WARNING ORDER

1. Enemy situation _____

_____

2. Mission _____

_____

3. General instructions

   a. Special teams/task organization _____

   _____

   b. No earlier than move time _____

   c. Initial NAI's for force security _____

   _____

   d. Leaders recon: Time _____

   Place _____

   e. OPORD brief: Time _____

   Place _____

   f. Operation time line: Start _____

   End _____

4. Special instructions _____

_____

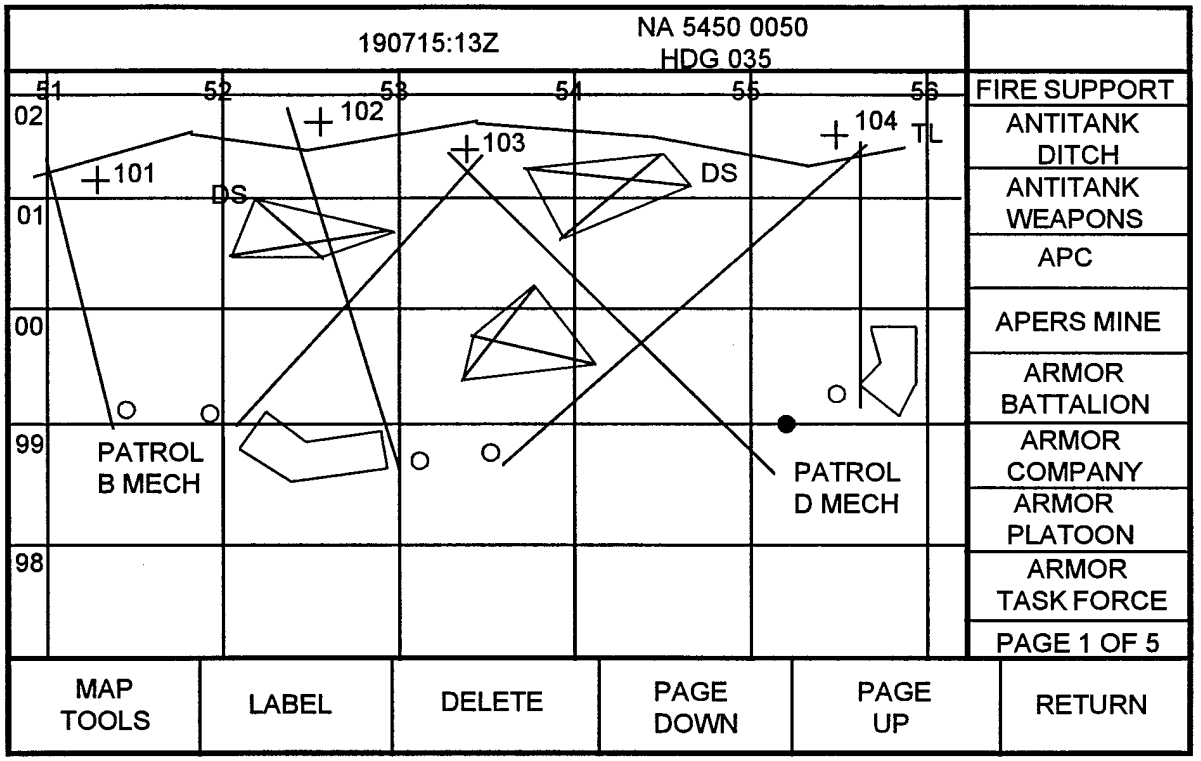
_____

_____

_____

2-3

2-4



Task force sector sketch with patrol routes (ST 71-2-2)

INITIAL R&S OVERLAY EXAMPLE

STEP 3: MAKE TENTATIVE PLAN

A. ESTIMATE OF THE SITUATION

STEP	ACTIONS	✓
	Note: Cdr in BCV makes parallel estimate from C2V staff info and wargaming on his ASAS. This is the Staff Estimate of Situation:	
1	Mission: S2 and S3 Air use Bde Operations Order for mission analysis. Use info from Cdr's Restated Mission & Planning Guidance	
2	Situation and COA's	
	a. Situation (METT-T):	
	1. Terrain, Weather, Enemy - S2 & S3 Air use ASAS for terrain analysis - S2 requests weather & enemy sit. update from Bde via ASAS/B2C2	
	2. Own situation - S3 Air updates friendly situation on B2C2 and IVIS	

3-1

STEP 3: MAKE TENTATIVE PLAN

A. ESTIMATE OF THE SITUATION

STEP	ACTIONS	✓
2	continued: a. 3. Time (execution) : XO's time line	
	b. Courses of Action/Analysis of COAs	
	1. COA info taken from Cdr's Restated Mission/Planning Guidance	
3	Analysis & Comparison of COAs	
	a. Staff analyzes COAs and Wargames concurrently using ASAS and IVIS	
	b. Staff estimates enemy actions during the operation, what COAs needed to counter this	
	c. S3 Air & S2 Wargame, play roles, capture action and reaction by BOS	
	d. Five things make COAs different:	
	- Simplicity	
	- Ability to mass fire	
	- Supportability	
	- Controllability	
	- Set-up by BOS	

3-2

STEP 3: MAKE TENTATIVE PLAN

A. ESTIMATE OF THE SITUATION

STEP	ACTIONS	✓
3	continued: e. FSO updates initial Fire Support Plan with info from Bde, staff wargaming, enters into IVIS as Fire Support Overlay	
	f. S1/S4 continue to plan CSS piece of operations, receive SITREPS on Log and Personnel from 1SG's via B2C2	
4	Recommendation	
	a. After wargaming COAs staff makes most likely COA recommendation	
	b. Two COAs entered as Operations Overlay 1 and 2 on IVIS: - Overlay 1 = The intended COA - Overlay 2 = Some modification	

3-3

COURSE OF ACTION COMPARISON

	Compare Courses Of Action considering how well the COA:	1	2	3
1	Supports scheme of maneuver			
2	Helps command and control			
3	Concentrates combat power at decisive point			
4	Forces provide mutual support			
5	Responds to maneuver elements and reserve			
6	Utilizes enhanced digital capability for rapid tempo			
7	Utilizes enhanced digital capability for dispersed ops			
8	Utilizes digital capability for precision target acquisition			
9	Meets commo net distance, terrain, threat constraints in all phases of movement			

3-4

COURSE OF ACTION COMPARISON			
Compare Courses Of Action considering how well the COA:	1	2	3
10 Exploits enemy weaknesses			
11 Accounts for weather			
Uses best avenue of approach			
12 Provides enough maneuver space			
13 Maximizes observation & ranges of weapon systems			
14 Provides cover and concealment			
15 Considers obstacles			
16 Controls key terrain			
17 Helps speed execution			
18 Does not require adjustment of unit positions			
19 Uses all HQs			
20 Requires normal CSS			
Decision			

STEP 4: INITIATE MOVEMENT

A. INITIATE MOVEMENT

STEP	ACTIONS	✓
1	Once Cdr decision issued, movement can be initiated via IVIS and B2C2	
2	Initiate movement, conduct reconnaissance and complete the plan actions happen separately but concurrently	
3	Digital systems are used to speed the process of orders development	
4	Initial time-distance analysis determines when units start movement	
5	If movement occurs concurrently with planning, include movement route on digital operations overlay	
6	Post implementing instructions (movement times) to overlay as free text, distribute digitally	

4-1

INITIATE MOVEMENT	
QUARTERING PARTY/OCCUPY AA	
TASK: OCCUPY AN ASSEMBLY AREA	
1	TF Cdr and staff select assembly area providing:
	a. Concealment and space for dispersion
	b. Entry and exit routes
	c. Drainage and level areas
	d. Defense and security (open areas)
2	TF Cdr and staff issue an OPORD that:
	a. Designates areas for each subord element
	b. Designates quartering party(ies) with at least one digital commo vehicle per Co.
	c. Appoint staff member as Q party OIC
	d. Specifies Order Of March to exploit enhanced digital navigation capabilities
	e. Prep/forward graphics on IVIS fire support overlay that contains: (1) Route (critical points) (2) Tentative positions within AA (3) Sectors of observation for Co. teams
4-2	

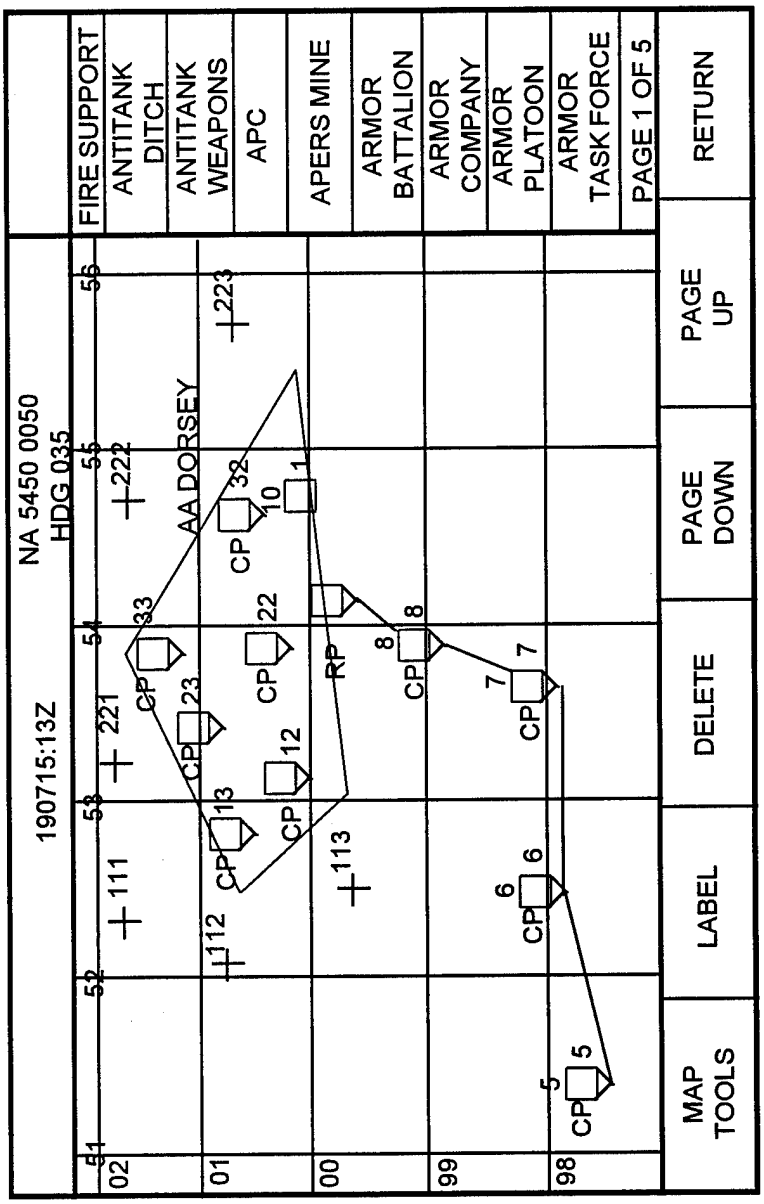
INITIATE MOVEMENT	
QUARTERING PARTY/OCCUPY AA	
3	The OIC prepares quartering party, ensures:
	a. IVIS vehicles have digital connectivity
	b. Digital systems configured to mission
	(1) Ops 2, Fire Support, Obstacle, and Enemy overlays loaded in IVIS data base
	c. IVIS in Combat mode, Fire Support /Ops Overlay displayed, contact report page opened
	d. Supplements overlays w/ instructions re. actions on contact, weapon orientation, ...
	e. Gives time of main body arrival at SPs and RPs
	f. Gives Order of March, speed, interval, MOPP
	g. Designates priority of work, maintenance, and resupply
	h. Directs occupation under limited visibility

INITIATE MOVEMENT	
QUARTERING PARTY/OCCUPY AA	
4	TF Q Party OIC directs the Q Party to occupy AA, prepare for arrival of the TF main body
	a. Quartering party moves using POSNAV and Fire Support Overlay waypoints
	b. Advance party updates the FS Overlay from roadmarch and assembly area info: (1) Routes from TF RP to each Co/Pl position (2) Entrances, exits, internal routes (3) Lft/Rt limits of fire for Co teams using IVIS target reference points (TRPs) (4) Locations of mines/obstacles in the AA
	c. Posts revisions to March Route on Fire Support Overlay
	d. Assigns a crew member to manually enter control measures received from non-IVIS units
	e. Forward revised IVIS FS Overlay to main CP
	f. Establishes local security in the AA

4-4

INITIATE MOVEMENT	
QUARTERING PARTY/OCCUPY AA	
5	TF occupies AA using POSNAV or GPS and waypoints
	a. Moves into position using automated FS Overlay w/out halting or blocking routes
	b. Maintains noise, light, track mark discipline
	c. Forwards IVIS SITREP to main CP
6	TF conducts AA operations, prep for combat
	a. Maintains security, concealment
	b. Radio listening silence, IVIS in RIU silence
	c. Establish hot loops, Co Teams and Main CP
	d. Prep/disseminate Co/Pl level OPORDs, conduct backbriefs, rehearsals, leader reconnaissance
7	TF departs the assembly area
	a. Recover protective obstacles
	b. Move equip/supplies as per OPORD
	c. Veh's move directly from hide positions to road march config, do not line up on roads
	d. Order of march empties AA from front to rear
4-5	

ASSEMBLY AREA OVERLAY EXAMPLE



Assembly area overlay (ST 71-2-2)

4-6

PERFORM TACTICAL ROAD MARCH	
1	TF CDR and staff develop and issue the march order.
	a. Enter route, checkpoints, SP, RP, other control measures on Ops 1 overlay
	b. Designate order of march, march rate, catch-up speed, and march interval
	c. Put non-IVIS units between IVIS equipped teams to aid navigation
	d. Designate marshalling area on Ops overlay to organize march column and final brief
	e. Provide statement of enemy situation, weather, and visibility conditions
	f. Assign sectors of observation to Co. teams including flanks and rear of TF
	g. Plan for actions on contact (ambush, indirect fire, air, meeting engagement)
	h. Plan refuel sites along route of march
	i. Designate leader's locations, commo plan

4-7

PERFORM TACTICAL ROAD MARCH	
2	TF prepares for road march
	a. Top off vehicles
	b. Post road guides, mark routes for non-IVIS units
3	TF conducts recon for each route and digitally confirms:
	a. Availability/conditions of routes
	b. Alternate routes
	c. SP/RP locations
	d. Location/suitability of holding/assembly areas, areas for maint. and refueling
	e. Distance between critical points, total distance between SPs and RPs.
4	TF conducts road march
	a. Maintenance performs recovery operations
	b. TF maintains security during march

4-8

STEP 5: RECONNAISSANCE

B. CONDUCT RECONNAISSANCE

STEP	ACTIONS	✓
1	Recon concurrent with planning	
	a. Staff prepares/distributes digital recon plan to initiate movement	
	b. Assign Co.'s specific recon obj's	
2	Recon plan includes control measures	
	a. Limits of advance & contact points	
	b. Tentative Battle Positions	
3	Company recon tasks	
	a. Designate assigned CPs as way-points, use POSNAV to navigate to recon objectives	
	b. Conduct physical objective recon	
	c. Determine effect of METT-T on plan	
	d. Annotate on digital Ops Overlay	
	e. Co. Cdr forwards Ops overlay to TF Cdr, S3, and XO	
4	Recon Ops Overlay used to refine plan	
5	Co. Cdrs may physically linkup and backbrief results of reconnaissance	

5-2

STEP 5: RECONNAISSANCE

A. CONTROL RECONNAISSANCE

STEP	ACTIONS	✓
1	Co. XOs start company movement while Co. Cdr's go on leaders recon to verify and refine their plans, send updates to S3 Air via IVIS	
2	S3 Air controls Bn movement using IVIS	
3	Bn Cdr takes Bn FSO, Engr, ADA Pldr, and Co. Cdr's on leaders recon. Gives Cdr's concept of operation prior to issuing OPORD	

STEP 6: COMPLETE THE PLAN

A. STAFF UPDATE

STEP	ACTIONS	✓
1	R&S Plan	
	a. S2 uses ASAS to update R&S plan	
	b. S2 enters R&S plan into IVIS as updated Enemy Overlay	
	c. S2 sends R&S plan/Enemy Overlay to scouts, S1, S3, S4, Bn Cdr	
2	Fire Support Plan	
	a. Bn FSO completes Fire Support Plan on IFSAS	
	b. FSO inputs graphics into IVIS as updated Fire Support Overlay	
	c. FSO sends Fire Support Plan to subordinate units via IVIS	
3	Engineers Plan	
	a. Engineers input Mobility, Counter-Mobility Survivability graphics into IVIS as updated Engineer Overlay	
	b. Engineer Overlay sent to subordinate units via IVIS	

6-1

STEP 6: COMPLETE THE PLAN

A. STAFF UPDATE

STEP	ACTIONS	✓
4	continued: Staff in C2V further develop tentative plan, begin inputting info into Operations Order on Ops Overlay 1	
5	Issue WARNO#3	
	a. Verbal warning order issued by staff	
	b. WARNO#3 states Situation, Mission (may be "No change"), and includes the message "Graphics to follow, acknowledge"	
	c. Refined graphics (Fire Support, Engineer, and Enemy Overlays/R&S Plan on IVIS and B2C2 are now sent out via IVIS to Bn Cdr, S3, CTCP, and companies	

STEP 6: COMPLETE THE PLAN

B. UPDATE THE PLAN/ORDER

STEP	ACTIONS	✓
1	Bn Cdr has made decision, issued guidance, conducted leader recon, now:	
	a. Staff quickly prepares OPORD on Operations Overlay 1 using tentative plan as basis and graphics already sent digitally	
	b. Terrain board set up for walk through after OPORD issued	
	c. Paper copies of OPORD made for distribution (don't rely exclusively on digital)	

6-3

OPORD FORMAT

1. Enemy situation
2. Most likely/dangerous ECOA
3. Higher unit's mission
4. Higher Cdr's intent
5. Attachments
6. Detachments
7. TF mission
8. TF Cdr's intent
9. Matrix of unit responsibilities by event/phase:

Unit	Event/Phase			
	Phase 0	Phase I	Phase II	Phase III
Scouts Co/Tm A Co/Tm B Co/Tm C Co/Tm D Mortars A/B Priorities of fire/targets Eng POE/ M-C-S ADA/WPNS STAT				
Weather				

6-4

FRAGMENTARY ORDER

(FRAGO provides changes to an existing order. Address only elements that have changed)

Reference _____

_____

_____

Task organization _____

_____

_____

1. Situation _____

_____

2. Mission _____

_____

3. Execution _____

_____

4. Service Support _____

_____

5. Command/Signal _____

_____

6-5

STEP 7: ISSUE THE ORDER

A. STAFF ISSUES THE ORDER

STEP	ACTIONS	✓
1	OPORD issued verbally by Bn S3 and Bn staff to Bn and company Cdr's	
2	OPORD sent digitally to companies on Operations Overlay 1 through company 1SG's via B2C2	
3	Each Cdr gets paper copy of OPORD and conventional graphics	

7-1

STEP 8: SUPERVISE

A. CONDUCT REHEARSALS

STEP	ACTIONS	✓
1	OPORD issued, Cdr & staff supervise combat prep & execution. Cdr ensures intent & decisions are implemented.	
2	Backbriefs	
	a. Cdr's intent for digital reporting	
	b. Event driven triggers to move to voice reporting	
	c. Procedures for initiating automated/ voice request for fire support	
3	Conduct rehearsals:	
	a. Terrain board walk-through	
	b. Digital rehearsal in place: Bn staff sends enemy updates to Co. Cdr's via IVIS. Co. Cdr's role play through the operations.	

STEP 8: SUPERVISE

B. INTEL/WEATHER UPDATES

STEP	ACTIONS	✓
1	Request/issue intel & weather update:	
	a. S2 requests/receives updated intel and weather from Bde via ASAS	
	b. S2 sends verbal weather updates, digital enemy updates to Cdr's, CTCP, and slice units	
	c. Co.'s send Engr updates via IVIS	

C. EXECUTE

8-2

9: MOVE TACTICALLY	
1	TF Cdr uses digital command and control systems (IVIS/B2C2) to accomplish the following tasks during offensive operations:
	a. Speed development/dist of combat plans
	b. Maintain dispersion/orientation of formations
	c. Monitor movement of subordinate maneuver units
	d. Report initial contact, initiate battle drills
	e. Develop/distribute contingency plans
	f. Maximize situational awareness during limited visibility offensive operations against degraded enemy defense
2	TF Cdr exploits advanced C2 capabilities of digitized companies. Capitalize on:
	a. Ability to make initial contact with digitally equipped scout plt and use of HL-UAV. Make initial contact with digitized Co's by having: (1) Advanced guard in mvmnt to contact (2) Lead company in deliberate attack
9-1	

9: MOVE TACTICALLY	
2	b. Ability of digitized units for rapid coordinated attack from protected position with clear picture of enemy situation
	c. Ability of digitized Co. to quickly mass accurate fires on enemy: - Support/attack by fire, overwatch
	d. Ability of digitized Co to identify, report, and guide the Bn through assault breaching of obstacles
	e. Enhanced security of TF by assigning digital units security missions (guard/ screen)
	f. Precision non-digital unit movement achieved by tethering them to digital units with portable GPS devices
3	Cdr's intent for digital forces should address:
	a. When (when during operation will digital techniques be used)
	b. Why (verify IPB, track unit movement, other)
	c. Who (which unit)
	d. How (what reports/techniques will be used)
9-2	

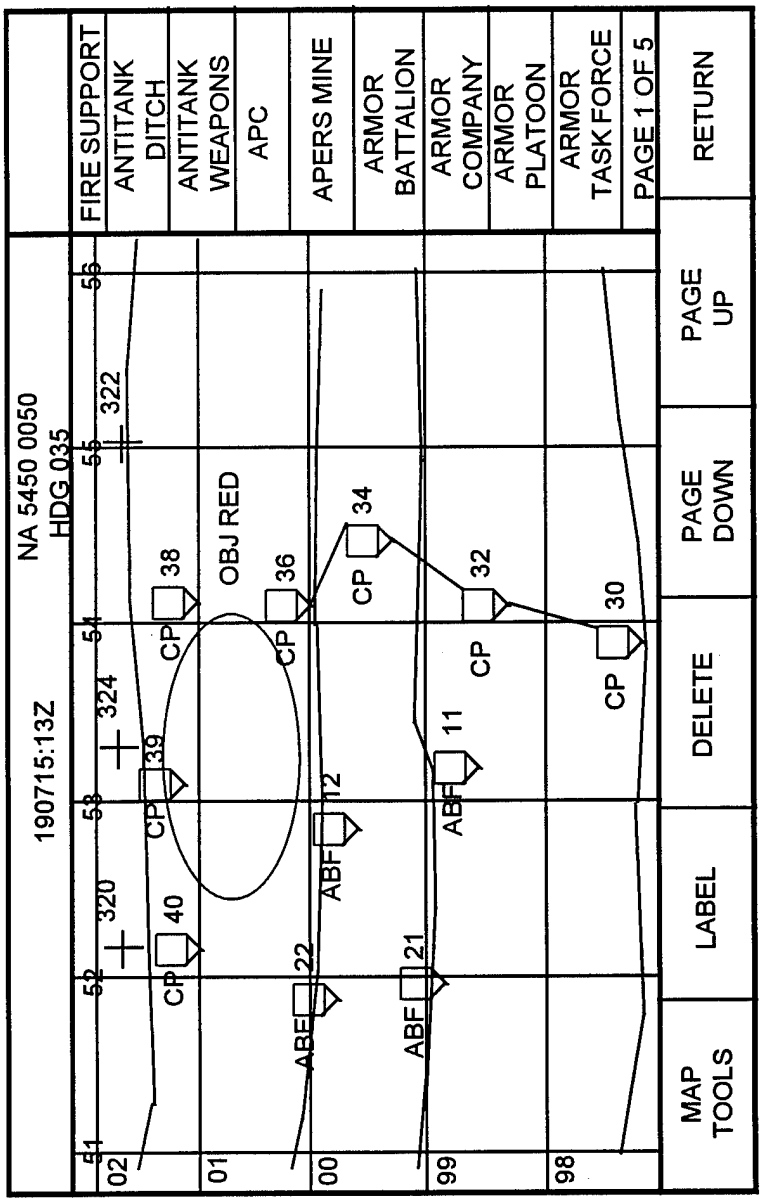
9: MOVE TACTICALLY	
4	Unit reverts to FM voice if sending/processing digital reports is disruptive/counterproductive
5	Tactical movement considerations:
	a. Dispersion gives TF flexibility to react, freedom to maneuver, reduces vulnerability
	b. Digital C2 allows lateral/in-depth dispersion
	c. Speed during movement reduces enemy's ability to acquire and engage friendly forces, reduces enemy's ability to react/ reposition
	d. Digital C2 gives Cdr rapid situation/ position updates
	e. Digital overwatch elements send automated contact reports to bounding element, use digital link to artillery/mortar systems to direct suppressive fires or obscuration while bounding element moves
	9-3

9: MOVE TACTICALLY	
6	Task organization
	a. Tethering used to help nondigitized units maintain speed and orientation
	b. Security force and advanced guard can be combined to share M1A2 digital capabilities
	c. Using scout UAV movement to contact can be made without exposing friendly forces
7	Movement techniques
	a. Units follow digital waypoints to maintain lateral dispersion within formation
	b. TF Cdr can place enemy overlay on current Ops overlay, observe progress of Co. icons to change movement, reposition CS or CSS

9: MOVE TACTICALLY

8	Offensive fire planning
	a. Digital systems give Cdr's greater control of maneuver and fire control. Direct fires can be enhanced through digital graphic control measures using TRPs and quadrants such as: (1) Sectors (based on TRPs) (2) Quadrant TRP (3) Target array quadrant (4) Closest TRP (5) Pattern firing (6) Grid

DIGITAL GRAPHIC CONTROL MEASURES EXAMPLE



Digital graphic control measures (ST 71-2-2)

9-6

10: ASSAULT	
1	TF detects the enemy
	a. Detecting element reports enemy to TF Cdr: (1) locations (2) activity (3) composition (4) size (5) presence of obstacles/fortifications
	b. Detecting element provides info before lead Co. Tms make contact
2	TF develops the situation
	a. Collect info to plan attack against enemy weaknesses Digital enemy overlay updated/annotated (1) locations of enemy/natural obstacles (2) enemy antitank weapons (3) fire sacks (4) positions/flanks/possible routes (5) overwatch positions (6) support-by-fire positions Updated digital enemy overlay forwarded

10-1

10: ASSAULT

3	TF CDR develops and distributes FRAGO for attack a. Cmd group and staff in BCV syncronizes TF attack by FM voice during attack
	b. Scout UAV finds clear path to assault position for maneuver element prior to hasty attack
	c. During assault UAV loiters for early warning of enemy intentions and counterattack
	d. Assigns specific mission to each maneuver Co. Tm, positions and TRPs annotated on the Ops 1 update (FRAGO) for the assault: - overwatch position/terrain objective - support-by-fire position/sectors of fire - attack-by-fire position/sectors of fire
	e. FRAGO gives subord Cdr's/leaders enough time to distribute overlay updates & issue FRAGOs to implement assault (enough time for non-digital elements too)

10: ASSAULT	
4	TF prepares for the assault
	a. Accomplishes task reorganization
	b. Ensures plan (Ops 1, Enemy, Fire Support overlays) is distributed, leaders oriented on terrain and missions
	c. Moves to positions to begin/support attack. Digital capabilities are exploited: (1) Co's move en mass from LD to support-by-fire positions without halting, immediately begin suppressive fires (2) Co's transmit enemy loctations to assault units via digital Contact/ SPOTREP (3) Assaulting units move with guns laid to known enemy positions
	d. FRAGO identifies and marks breaches/ bypass routes and distributes an automated obstacle overlay update
5	TF fixes the enemy
6	TF assaults
10-3	

11: DEFEND	
1	S3 gives time/place for recon results back-brief to TF Cdr by Co. Cdrs, special Pldr's
	a. S3 pre-positions BCV/C2V forward overlooking engagement area, or areas of TF's main defensive effort
	b. To save time, Cdrs forward their annotated recon overlays digitally en route to BCV.
	c. TF Cdr and S3 review recon overlays and formulate questions prior to arrival of Cdrs
2	Co. Cdrs take turns briefing TF Cdr in BCV using Tactical Computer Unit/B2C2
	a. Cdrs hear the recon results of each Cdr and receive guidance from TF Cdr
	b. As Cdrs brief their findings S3 adds/deletes control measures from digital Ops overlay (tentative plan) to refine TF defensive plan
	c. Revised overlay is forwarded digitally from the BCV to main CP, CTCP, Co. Cdrs.
	d. Revised Ops overlay sent digitally to Orders Group in advance of the actual OPORD
11-1	

11: DEFEND

3	TF Cdr and staff plan the defense and issue an OPORD:
	a. OPORD positions M1A2/digital equipped security forces on all approaches to detect enemy activity in the MBA - May place scouts OPCON to M1A2 Co. Tm to facilitate target acquisition, surveillance, and automated tactical reporting
4	TF prepares the defense
	a. Prepares fire plans, digital sector sketches (1) May limit the number of TRPs in engag. area by placing one out for each maneuver Co. Have each Co. site the TRP at the range the TF Cdr intends to destroy enemy (accomplished during leaders recon of the defensive position). This normally corresponds with obstacle intent graphics planned by the staff.

11: DEFEND	
4	a. (cotinued) (2) Digital TRPs on final automated Ops Overlay (TF defensive plan) are used to trigger initial direct-fire engagements early in battle (3) Physical TRPs used to mass Co. fires at point where TF Cdr intends to destroy enemy
	b. OPORD annotates positioning of all required obstacles on automated Obstacles Overlay
5	TF defeats enemy recon and infiltration, and performs surveillance
	a. Security elements detect/track movement of enemy 2nd echelon. M1A2/digital equipped security force forwards periodic digital contact/spot reports

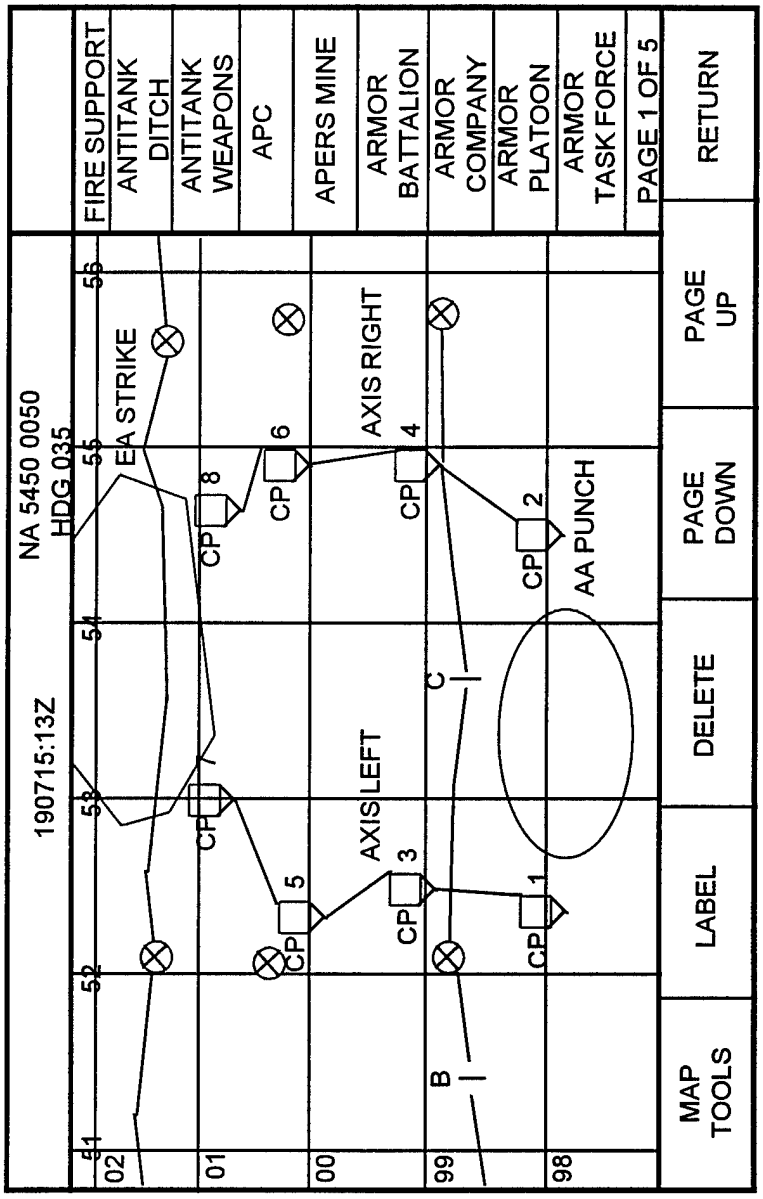
12: DIGITAL OVERLAYS & EXAMPLES

OPERATIONS 1 OVERLAY

1	Operations 1 Overlay used to record schemes of maneuver for tactical operations
2	Overlay is simplified equivalent of acetate operations overlay
3	Operations plan is developed over terrain data base depicted on LCU such as B2C2
4	Finalized operations plan is distributed as digital Operations 1 Overlay (IVIS/B2C2) to maneuver Cdr's and special Plt Ldr's
5	Operations 1 Overlay distributed prior to OPORD so Cdr's and Ldr's can review plan, post overlays to their maps

12-1

OPERATIONS 1 OVERLAY EXAMPLE



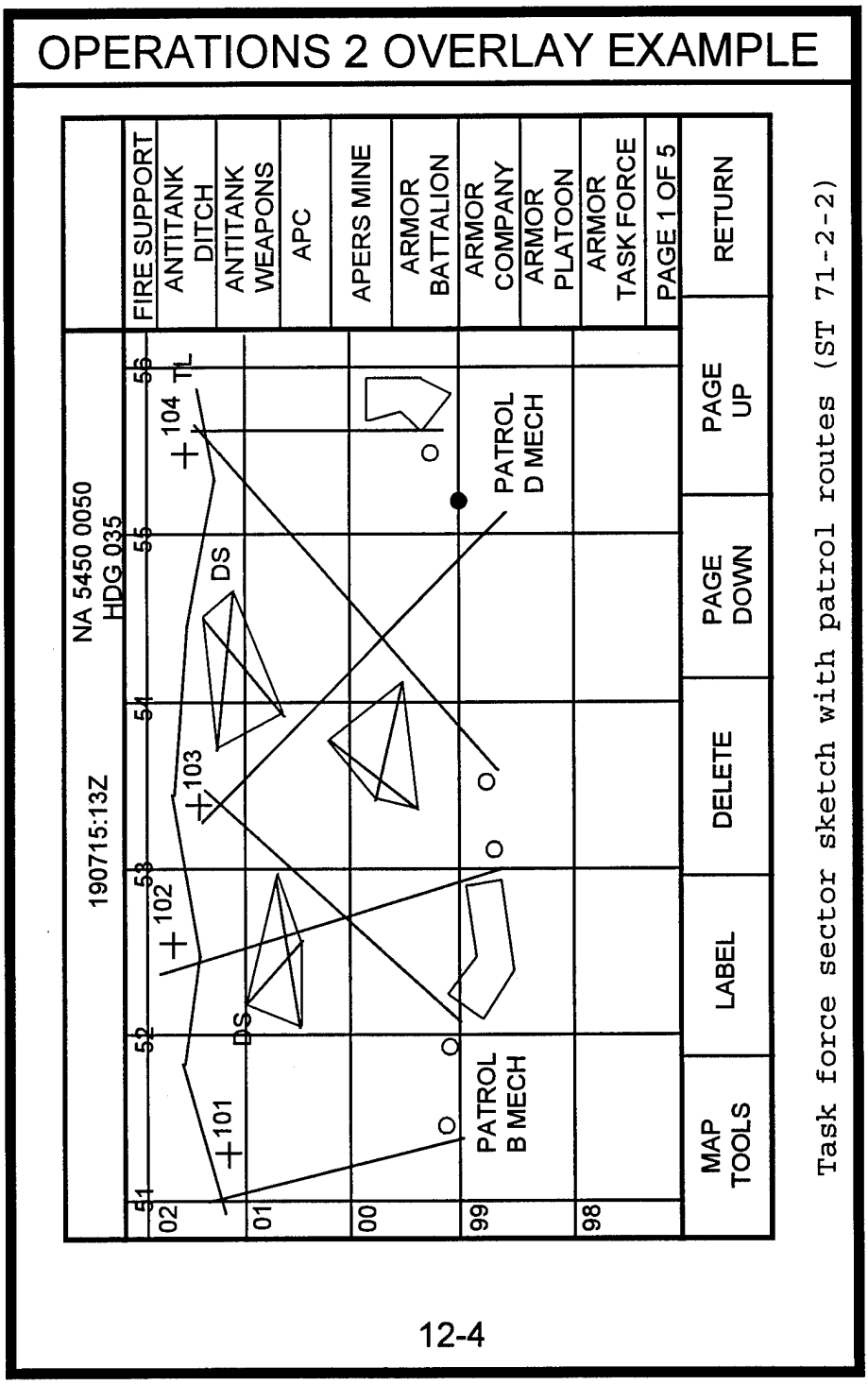
12-2

Task force defense of a sector (ST 71-2-2)

12: DIGITAL OVERLAYS & EXAMPLES

OPERATIONS 2 OVERLAY

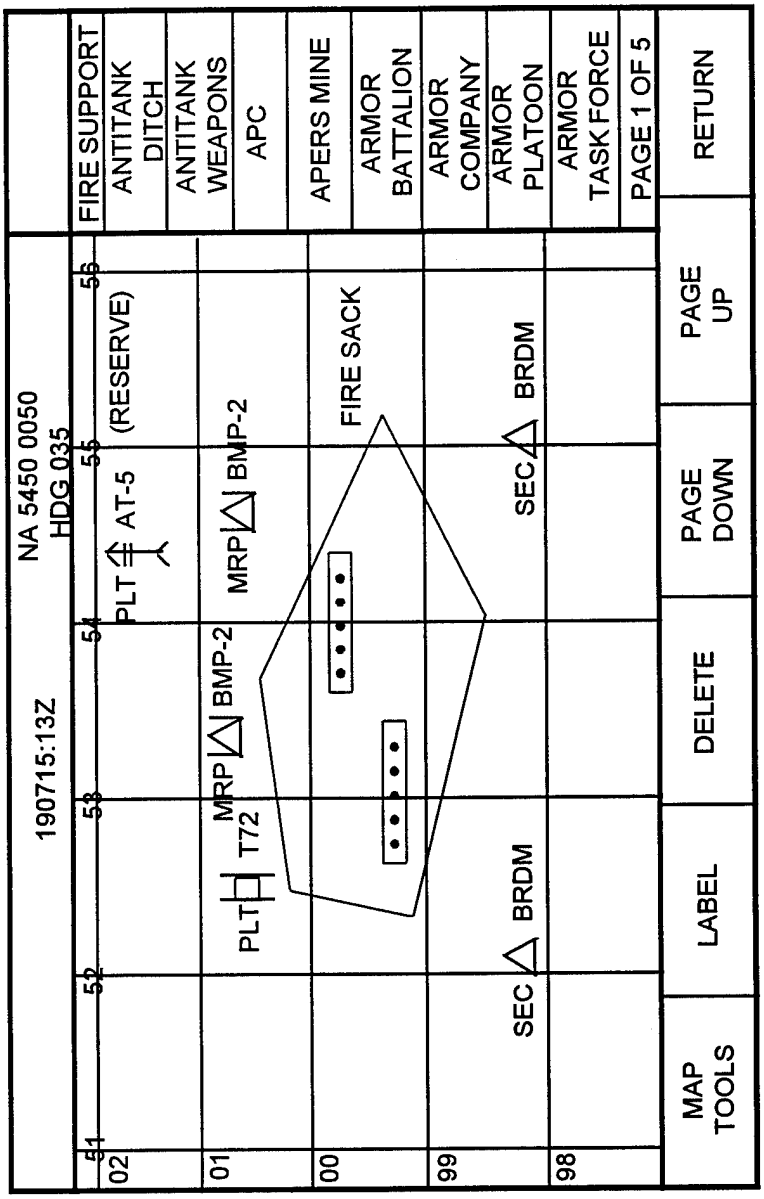
1	When WO is issued, Op's 2 Overlay is used to distribute initial R&S plan to scout platoon
	a. Allows reconnaissance concurrent with planning process, facilitates recon updates
	b. Allows distribution of recon objectives to digital maneuver companies during refinement of the tentative plan
2	In defense, Operations 2 Overlay used to convey TF Fire Support plan
	a. Fire plan aggregates Co. fire plans (IVIS & acetate sector sketches) into one digital overlay (1) Verify direct-fire synchronization (2) Ensure Cdr's intent is met
3	In offense, Operations 2 Overlay is reserved for maneuver graphics for "be prepared" missions
	a. Reduces clutter by putting contingency missions on separate overlay



Task force sector sketch with patrol routes (ST 71-2-2)

12: DIGITAL OVERLAYS & EXAMPLES	
ENEMY OVERLAY	
1	Digital Enemy Overlay is used in offense/ defense for counterrecon operations and to distribute/update the S2's situation template
2	Digital updates to Cdr's speeds up process
	a. Gives maneuver Co's simplified Enemy Overlay, helps them form scheme of maneuver
	b. Helps Co. Cdr's identify triggers for change in movement/formation based on enemy's probable disposition
3	During counterrecon op's digital Enemy Overlay used to confirm/deny situation template, update counterrecon force
4	Enemy icons the counterrecon force sends are automatically posted to Enemy Overlay, S2 compares to his ASAS situation template
5	Voice reports of enemy are manually posted to digital Enemy Overlay
6	Recon force Cdr uses Enemy Overlay to anticipate enemy's movement, notify his assets
12-5	

ENEMY OVERLAY EXAMPLE



Automated situation template. (ST 71-2-2)

12-6

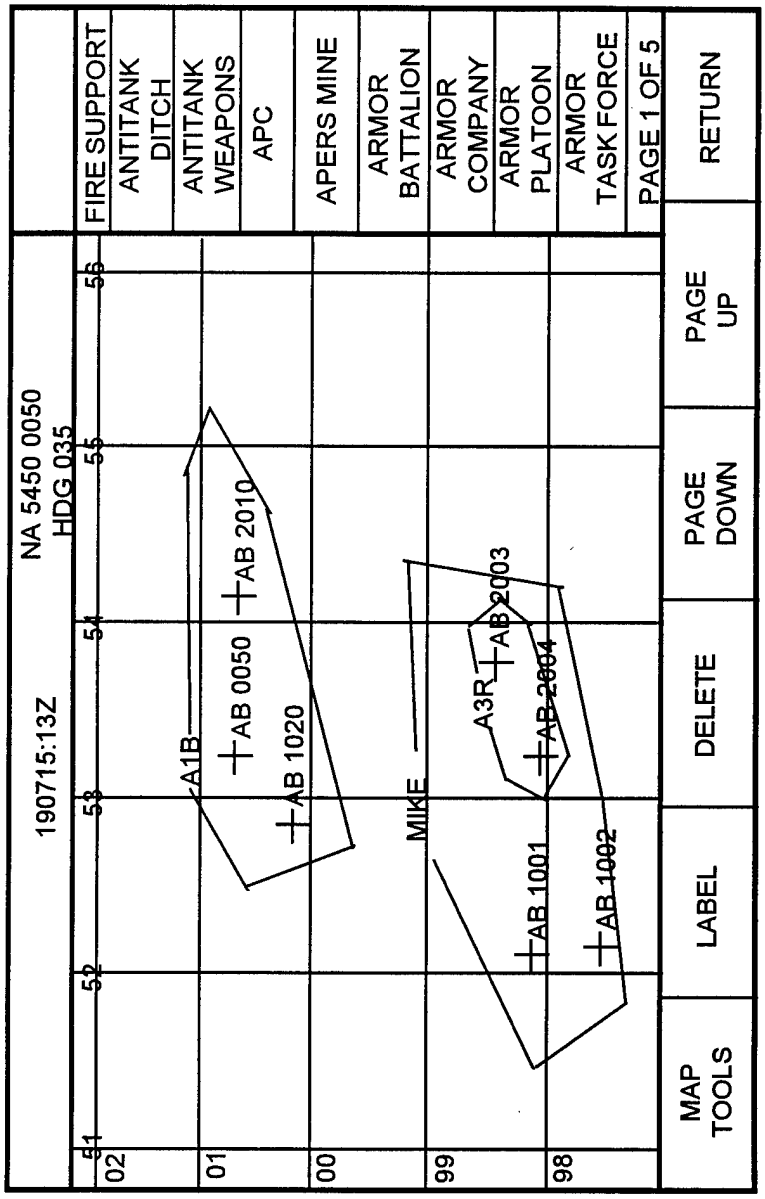
12: DIGITAL OVERLAYS & EXAMPLES

FIRE SUPPORT OVERLAY

1	Fire Support Overlay is used to record and distribute TF fire support plan
2	Co. fire support team (FIST) has input to FSO's fire plan during planning through digital message device (DMD)
3	FSO refines fire support plan, distributes prior to start of mission
4	Typical control measures from acetate Fire Support Overlay are included on digital overlay
5	Digital calls for fire from maneuver Co's are passed to Co. FSO in TACFIRE format, can be fed directly to artillery Fire Direction Center
6	Maneuver Cdr's should have complete indirect fire plan available, fires are more responsive to planned versus opportunity targets
7	IVIS fire support overlays are based on top-down planning with bottom-up refinement
8	IVIS does not have connectivity to AFATDS
9	FSO inputs IVIS overlay changes into AFATDS

12-7

FIRE SUPPORT OVERLAY EXAMPLE



Multiple targets on a fire support overlay. (ST 71-2-2)

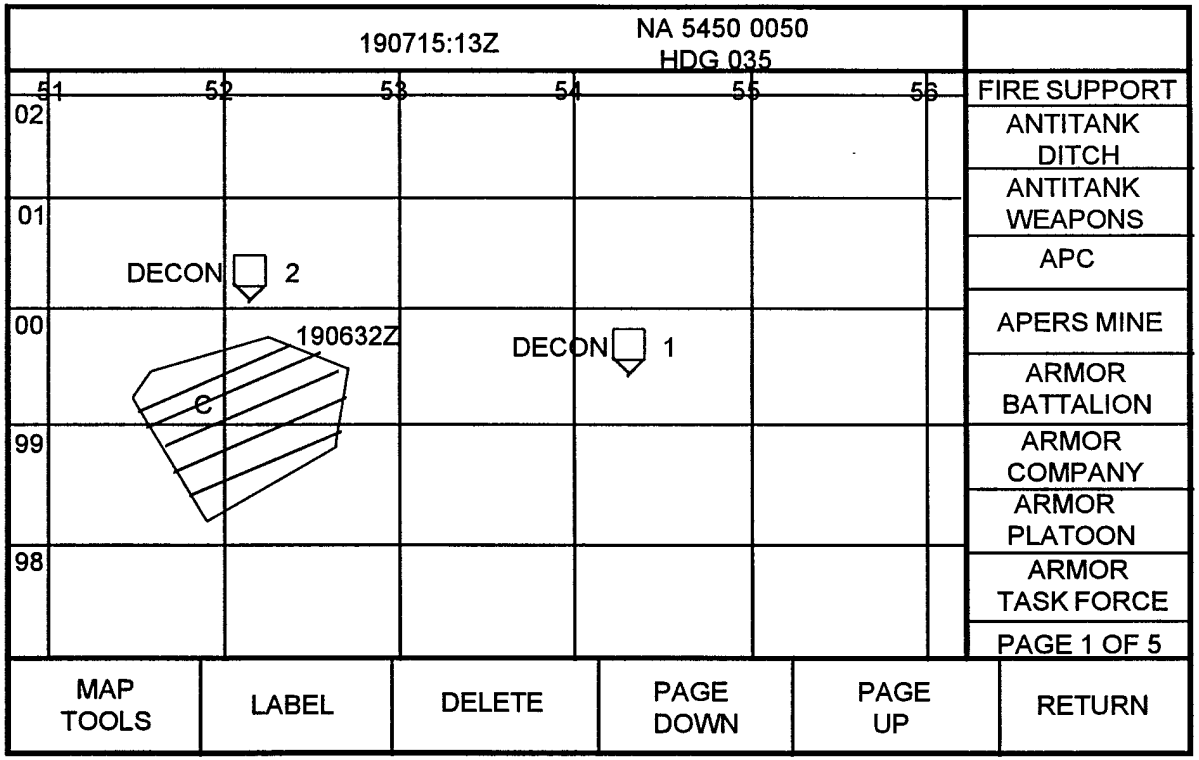
12-8

12: DIGITAL OVERLAYS & EXAMPLES

OBSTACLE OVERLAY

1	Used primarily in defensive operations to distribute task force obstacle plan
2	In the offense, used as detailed sketch of actual enemy obstacles a. Labels required to distinguish obstacle types
3	M1A2 unit Cdr's use laser to designate limits/ turnpoints of obstacles, these control measures are annotated on TF engineer's Obstacle Intent Overlay, sent digitally to main CP
4	Engineer rep. in main CP aggregates Co. Obstacle Overlays into single TF Overlay
5	Refined TF Obstacle Overlay retransmitted digitally back down to maneuver Cdr's, replaces the Co. Obstacle Overlay
6	Digital Obstacle Overlay allows TF Cdr, S3, and engineer to review obstacle positioning as they are emplaced, make corrections

12-10



OBSTACLE OVERLAY EXAMPLE

Obstacle overlay depicting chemical contamination. (ST 71-2-2)

(CARD 1 OF 6)

IVIS SETUP AND LOG-ON TASKS SINCGARS SETUP: TANK COMPANY SOFTWARE VERSION: 2.3.2.

1	Check cabling (see Fig. 1)
2	Set CB1 on SINCGARS to "OFF"
3	Start engine
4	Turn on SINCGARS power (1780 box)
5	Set CB1 on SINCGARS to "ON"
	SETUP "A" RADIO
6	Set channel to _____ (1)
7	Set "PWR" knob to _____ (M)
8	Set "MODE" knob to _____ (SC)
9	Set "FCTN" knob to "LD"
10	Using the key pad enter the following: - Hit "FREQ" key - Hit "CLR" key (5 second time-out) - Enter "A" radio band freq _____ (Co. net) - Hit "STO" key - Hit "DATA" key to view rate _____ (4800) - Hit "CHC" key to bring up other rates
11	Set "COMSEC" knob to "PT"
12	Set "FCTN" knob to "REM"
13	Repeat steps 6 through 12 for "B" radio
14	Enter "B" radio band freq _____ (Plt. Net)

13-1

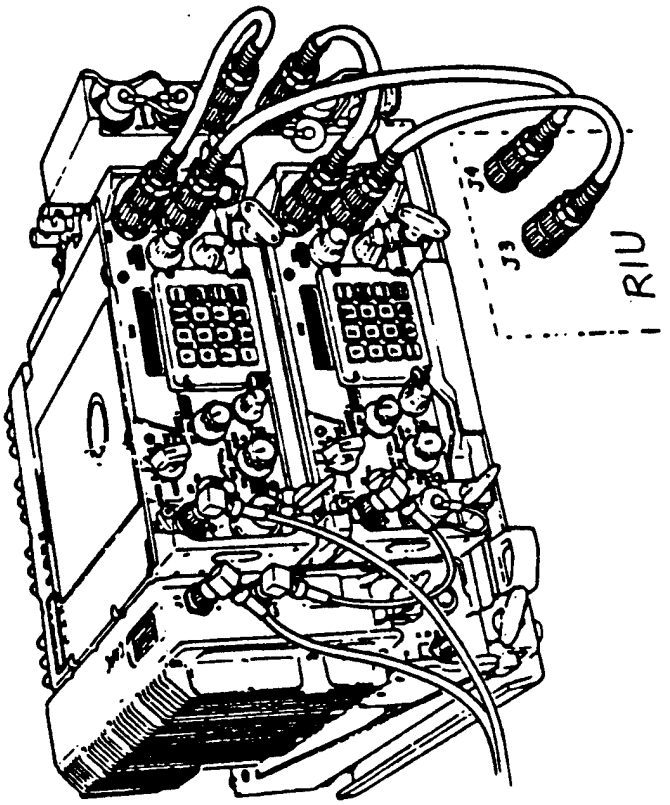


Figure 1. SINCGARS cabling.

13-2

(CARD 2 OF 6)

IVIS SETUP AND LOG-ON TASKS

	Enter IVIS password and user ID Press "RESET" button for cautions/warnings
1	Select "PRE/POST" mode (initialization only) (If system has previously been initialized, push "REPORTS" button to bring up the password prompt)
2	Push "IVIS" button
3	Enter password (LNNNNN) _____
4	Press "ENT" on keypad
5	Make sure "SIL WATCH" is "OFF"
6	View ID data. Press "USER ID" to change
7	Use keypad to enter data, then press "ENT" - CALL SIGN: Enter (LNLNN) _____ - VEHICLE NUM: Enter (LNNNN) _____ - DUTY POSITION: Select option _____ - PLT/CO/BN/BD: Select option _____
8	PLATOON: Enter (N) _____
9	COMPANY: Enter (L) _____
10	BATTALION: Enter (N-NNN) _____
11	BRIGADE: Enter (NNN) _____
12	Press "SAVE"

13-3

(CARD 3 OF 6)

IVIS SETUP AND LOG-ON TASKS

	IVIS RADIOS SETUP
1	Select "COMBAT" mode
2	Press "COMM"
3	Press "SLCT RT A/B" to select "A"
4	Press "SET RADIO"
5	Enter radio "A" data (see data card, pg 13-10)
6	Press "SAVE"
7	Repeat for radio "B" (see data card, pg 13-11)
8	Press "SAVE"
	TACFIRE NET SETUP (CO CDR, SQD LDRs) After entering radio "A" data and pressing "SAVE" enter the following:
1	RT MODE = SC
2	CHANNEL = 1
3	RF POWER = M
4	NET = TAC
5	DATA RATE = 1200
6	COMSEC VARIABLE = 1
7	COMSEC MODE = PT
8	TIME DELAY = OFF
9	Press "PRESET"
10	Press "RETURN" for "PRE/POST" menu

13-4

(CARD 4 OF 6)

IVIS SETUP AND LOG-ON TASKS

	POS/NAV SETUP
1	Select "PRE/POST" function
2	Select "AUX SYSTEMS" pushbutton
3	Select "POS/NAV SETUP"
4	W/ keypad enter each data line, then hit "ENT"
5	SPHEROID SELEDT: _____(Click "SPHERIOD SELECT" to view options)
6	POSITION UPDATE
	- Enter first 3 digits (NNL) _____. Hit "ENT" - Last 10 (LLNNNNNNNN) _____ Hit "ENT"
7	MANUAL HEADING (NNN.N) _____
8	MODE SELECT Select "AUTO INIT" begins 5 min. POS/NAV initialization. Don't move vehicle for 5 min.
9	ODOMETER GAIN (N.NNN) _____
10	ALIGNMENT ANGLE (Do not change factory setting)!
11	IVC MODE (Do not select this option)
12	Press "RETURN" 2 times for PRE/POST menu

13-5

(CARD 5 OF 6)

IVIS SETUP AND LOG-ON TASKS

LOG USERS ONTO IVIS NET (NCS ONLY)

NOTE: Only Net Control Station (NCS) pushes "LOG-ON" button. Co. Cdr is NCS for Co. net, Pldr is NCS for PLT net.

Avoid voice commo during NCS Log-On

Net users must enter POS/NAV, ID, and COMMO data first, then NCS logs the users onto his net

If someone other than NCS presses "LOG-ON" button everyone else will go "INACTIVE" on the user listing until that radio completes the log on cycle. Net will be OK and the NCS does not have to redo the log on procedure.

1	Push "RETURN" to clear warnings/cautions
2	Select "COMBAT" mode
3	Select "COMMO"
4	Press "SLCT RT A/B" to get the "A" radio net
5	Press "NET CONFIG"
6	Advise net members to standby (stay off net)
7	Press "LOG-ON": see "LOG-ON IN PROGRESS
8	Press "RESET":see LOG-ON COMPLETE
9	Press "RESET" advise net "A" open for msgs
10	Repeat steps 4 through 9 for net "B"

13-6

(CARD 6 OF 6)

IVIS SETUP AND LOG ON TASKS

LOG-OFF AND POWER DOWN

1	Press "COMBAT"
2	Press "COMMO"
3	Press "SLCT R/T A B" to select "A"
4	Press "NET CONFIG" pushbutton
5	Press "LOG OFF"
6	Press "CONFIRM"
7	Repeat for net "B"
8	Shut down radios - Set SINCGARS "FCTN" knob to "OFF" or "STBY" - Set CB1 toggle switch to "OFF" - Set 1780 box switches to "OFF"
9	Power down tank

13-7

IVIS REPORTS: SEND AND READ	
	TO SEND AN IVIS REPORT:
1	Press "COMBAT" button
2	Press "REPORTS" button
3	Press "IVIS REPORTS" button
4	Select a report: - CONTACT REPORT - SPOT REPORT - CALL FOR FIRE (EMBEDDED IN CONTACT/SPOT REPORT) - SITUATION REPORT - MEDEVAC REPORT
5	Enter data to fill in the blanks
6	Press "SEND" to send report any time
	TO READ AN IVIS REPORT:
1	Press "PRE/POST" button
2	Press "IVIS" button
3	Press "FILE/MGT" button
4	Select a report from file management menu
5	Press "READ" button to read report
6	Press "PAGE UP/PAGE DOWN" as required
7	Press "RETURN" for FILE MGT menu
13-8	

IVIS OVERLAYS: VIEW AND EDIT	
1	Press "PRE/POST" or "COMBAT" button
2	Press "MISSION PLANNING" button
3	Press "EDIT OVERLAY" button
4	Highlight an overlay: - Enemy - Fire Support - Obstacle - Operations 1 - Operations 2
5	Use Edit Overlay main menu tools to create or update an overlay: - Map Tools (scroll/zoom/location/ID) - Graphics (map graphics tools, labels) - Save (save changes Yes/No)) - Declutter (temporarily hide some graphics) - Set Waypoint - Return
6	Can use "Mission Planning" submenu - Display/edit/delete overlay - Send overlay - Navigate (map, compass, steer to)
	13-9

RADIO A NA 5450 0050 D
WO1CO1 1807155:132 HDG A

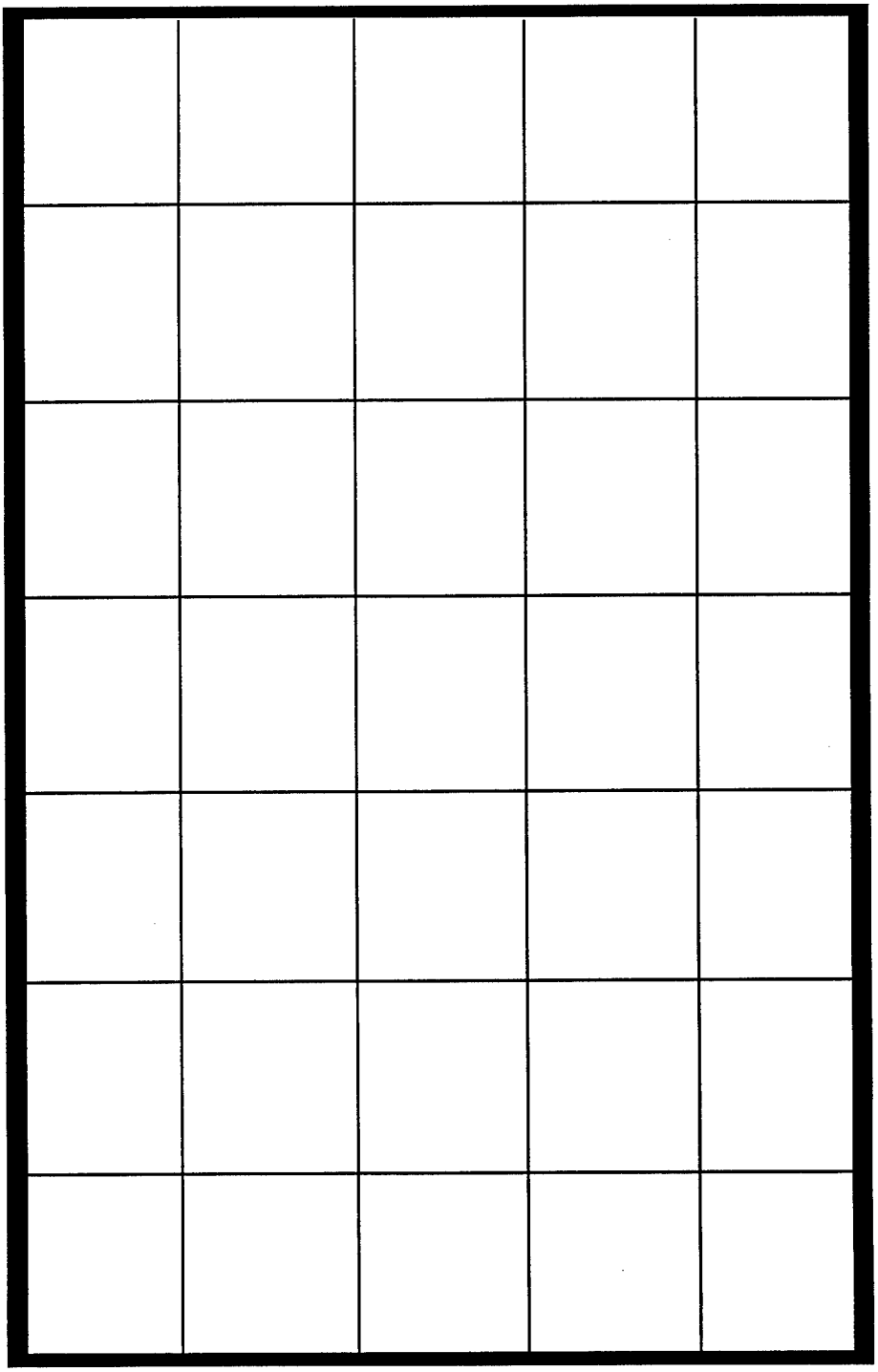
RT MODE	SC	FW	FH/M					
CHANNEL	M	1	2	3	4	5	6	CUE
RF POWER	LO	M	HI	PA				
NET	PLT	CO	BN	O+I	A/L	VCE	TAC	
DATA RATE	600	1200	2400	4800	16K			
COMSEC VARIABLE	1	2	3	4	5	6		
COMSEC MODE	PT	CT	RV					
TIME DELAY	OFF	ON						

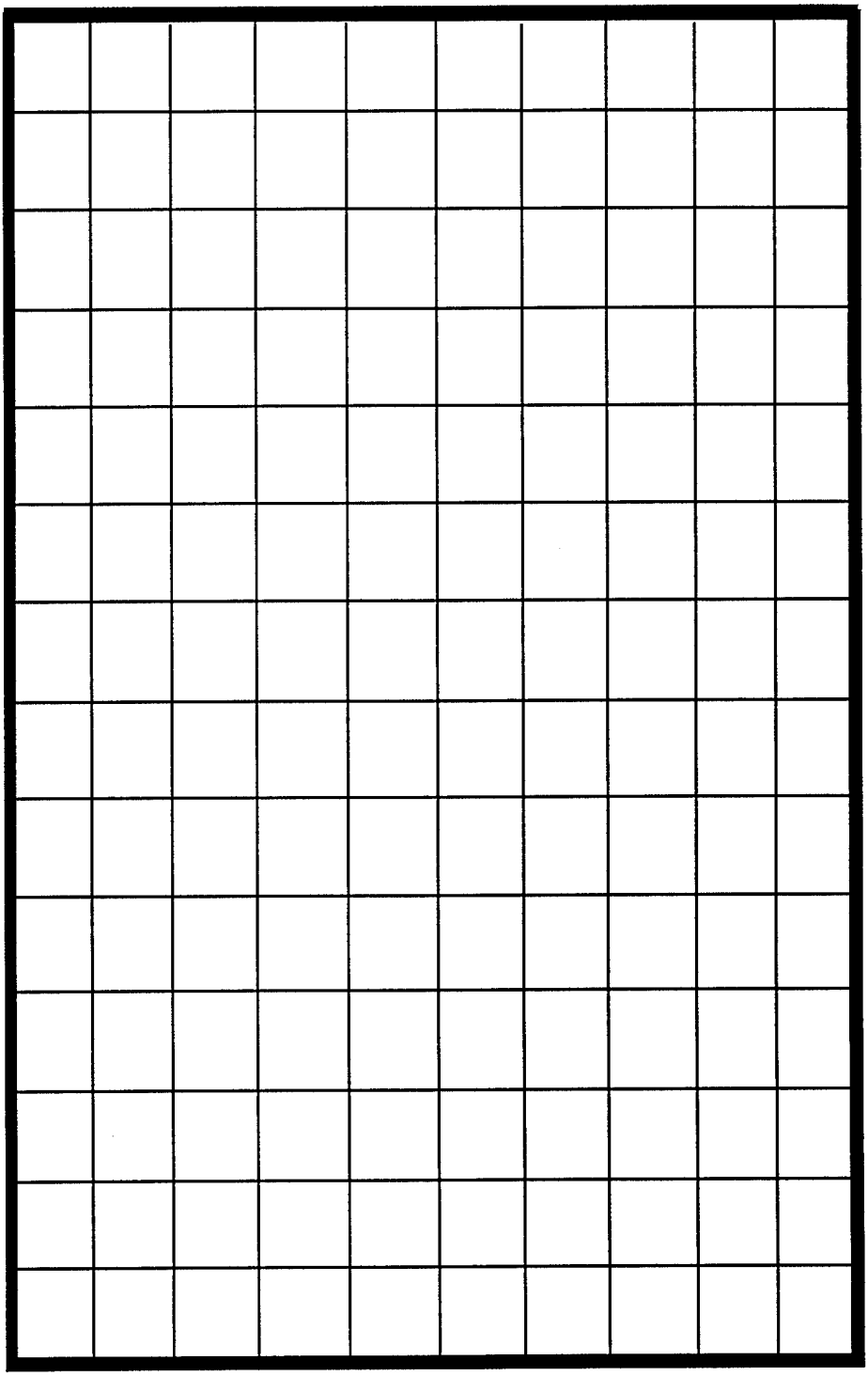
Figure 2. IVIS radio A data sheet.

RADIO B NA 5450 0050 D
WO1CO1 1807155:132 HDG A

RT MODE	SC	FW	FH/M					
CHANNEL	M	1	2	3	4	5	6	CUE
RF POWER	LO	M	HI	PA				
NET	PLT	CO	BN	O+I	A/L	VCE	TAC	
DATA RATE	600	1200	2400	4800	16K			
COMSEC VARIABLE	1	2	3	4	5	6		
COMSEC MODE	PT	CT	RV					
TIME DELAY	OFF	ON						

Figure 3. IVIS radio B data sheet.





NOTES